AUTOMOTIVE INDUSTRIES

PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY
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ENGINEERING • PRODUCTION • MANAGEMENT

APRIL 15, 1950

In This Issue . . .

Mass Marquenching of Gears

Design Features of Nash Rambler

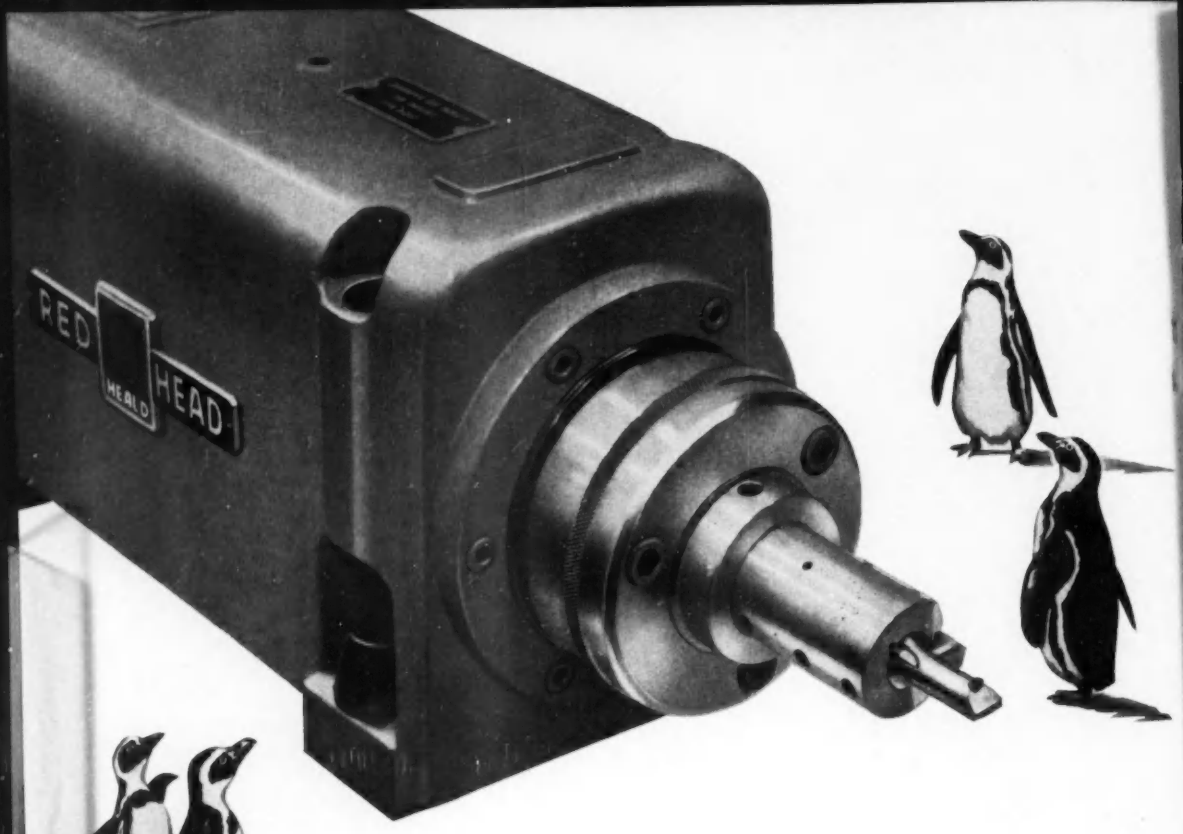
Two New Indianapolis Racers

Geneva Salon and Fiat's 1400 Model

Packard Marine Reverse Gear

Complete Table of Contents, Page 3

A CHILTON PUBLICATION



fifty per cent cooler

for better accuracy — higher precision!

Accuracy-destroying heat has been left out in the cold. Not only in the design of the new Heald Red-Head boringheads and wheelheads, but in every other element of the Heald machines as well.

That, in part, is Heald's answer to today's urgent need for higher precision, greater accuracy, and faster, lower-cost production.

Remember — when it comes to precision finishing, it pays to come to Heald.

Heald Red-Head boringheads and wheelheads run 50% cooler than oil-lubricated heads. What's more, they're lubricated for life — with the right amount of the right lubricant permanently sealed in. And the extra-rigid spindles are mounted in super-precision bearings protected by labyrinth seals. These Heald features mean longer, smooth-running operation — less maintenance — higher accuracy and precision for your grinding and borizing jobs.

HEALD

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

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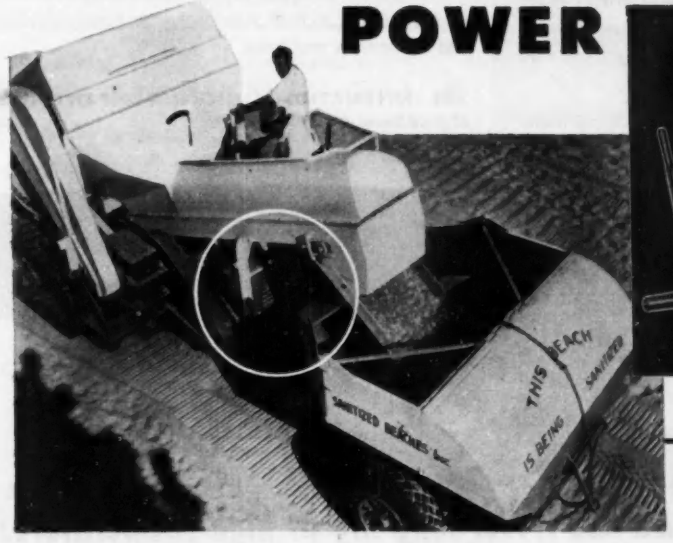
dry-cleaning the Beach

You don't send a beach out to the cleaners. But take a look at this beach being dry cleaned. With Waukesha power! The top layer of sand, to a depth of nine inches, is being scooped up and screened . . . broken glass and other dangerous debris removed and articles of value recovered . . . and the clean sand, fluffed and aerated, is being replaced—by the *Beach Sanitizer* —built by Sanitized Beaches, Inc., a division of Stephens-Adamson Mfg. Co., Aurora, Illinois. This same machine is also being used with great success to keep dirt race tracks and athletic fields "fast" as well as spruce in appearance. Powered by its Waukesha XAHU Gasoline Power Unit the *Beach Sanitizer* cleans a 6½-ft. wide strip of beach at a speed up to 1½ m.p.h., handling 2000-3500 sq. yds. of sand an hour.

Waukesha Model XAHU is complete with clutch and power take-off, built-in governor, full pressure oiling system, magneto and spark plugs, carburetor, air cleaner, water pump, and radiator cooling.

For descriptive details of this and other Waukesha Power Units, ranging from 8 to 400 horsepower, send for Bulletin 1408.

WAUKESHA
POWER



Model XAHU Power Unit—4-cyl., 3⅛-in x 4½-in., 186 cu. in. disp.; 43 hp. max. at 2000 rpm.

WAUKESHA MOTOR COMPANY
WAUKESHA • WISCONSIN
NEW YORK • TULSA • LOS ANGELES

INCONEL EXHAUST PIPE GOES 260,677 MILES

...and still no sign of wear out!

With Inconel exhaust pipes on 45 trucks Carolina Freight Carriers Corp. reports big savings in maintenance and replacement costs.

"*This Inconel* exhaust pipe has lasted 260,677 miles and it looks as good as though it had been installed last week. I believe it will last another 200,000 miles... and maybe more.*"

The enthusiastic words are from Mr. Thomas R. Harmon, Superintendent of Maintenance for the Carolina Freight Carriers Corp. of Cherryville, N. C. This concern operates 99 tractors, 18 pick-up trucks, and 143 large trailers.

Forty-five of the fleets' heaviest trucks are equipped with Inconel exhaust pipes. *And not a single on-the-road delay has ever been caused by an Inconel pipe.*

Carolina Freight Carriers Corp. is installing Inconel exhaust pipes throughout its fleet. Mr. Harmon states that Inconel exhaust pipes replace the originally-supplied steel pipes as the steel pipes burn out... usually within 25,000 to 40,000 miles.

The "fight back" qualities of Inconel... remarkable hot strength, high resistance to corrosion... make it a money-saving metal for other automotive trouble spots, too. Inconel has long been widely used for choke tubes. In severe road tests, Inconel bus and truck muffler interiors have given thousands of extra miles of service. And Inconel heater combustion chambers give several times the service life of less durable metals formerly used.

If you are a fleet operator or automotive manufacturer, you will want to know more about the amazing *money-saving* potentialities of Inconel and other Inco nickel alloys. Write for full engineering information and sources of supply *today*.

Our Technical Service Department always welcomes an opportunity to help you solve your metal-selection and fabrication problems.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

*Reg. U. S. Pat. Off.

Exhaust pipes usually fail first at the muffler junction. This Inconel exhaust pipe, removed for photographing after 196,035 miles of service, showed no signs of wear.

EMBLEM OF SERVICE
INCO
TRADE MARK

INCONEL*... for long life at high temperatures

AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

April 15, 1950 Vol. 102, No. 8

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AUTOMOTIVE INDUSTRIES is a consolidation of The Automobile (weekly) and the Motor Review (weekly), May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

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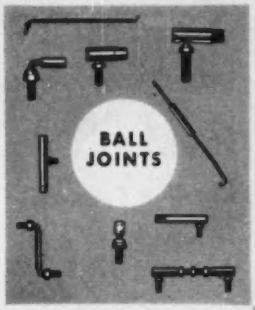
BALL JOINTS • PIPE PLUGS AND QUALITY SCREW MACHINE PRODUCTS



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LITERATURE

Comprehensive data on any or all Tourek products sent promptly upon request . . . write for yours now. J. J. TOUREK MFG. CO. 4701 W. 16th St., Chicago 50, Ill.

TOUREK

"THE BEST IN QUALITY SCREW MACHINE PRODUCTS"

ESTABLISHED IN 1920

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for fast, accurate cylindrical grinding

Use Simonds Abrasive Company Grinding Wheels . . . precision manufactured for precision work . . . correct in grain and grade specifications . . . for long lasting action and for your specific requirement from heavy stock removal to high quality finishing.

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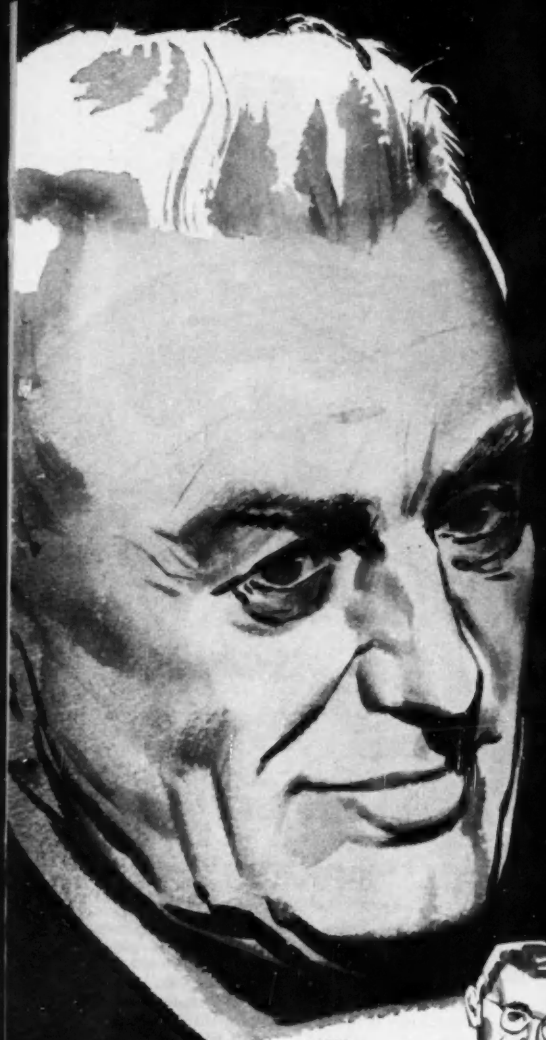

says the Chief Engineer:

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Muskegon, volume producer of both service and original equipment piston rings since 1921, offers not only unparalleled facilities for the casting, machining, testing and inspection of piston rings, but other equally important services as well. Muskegon is prepared to assist you in every phase of the design, packaging and merchandising of piston rings.

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Piston Rings

MUSKEGON PISTON RING CO.
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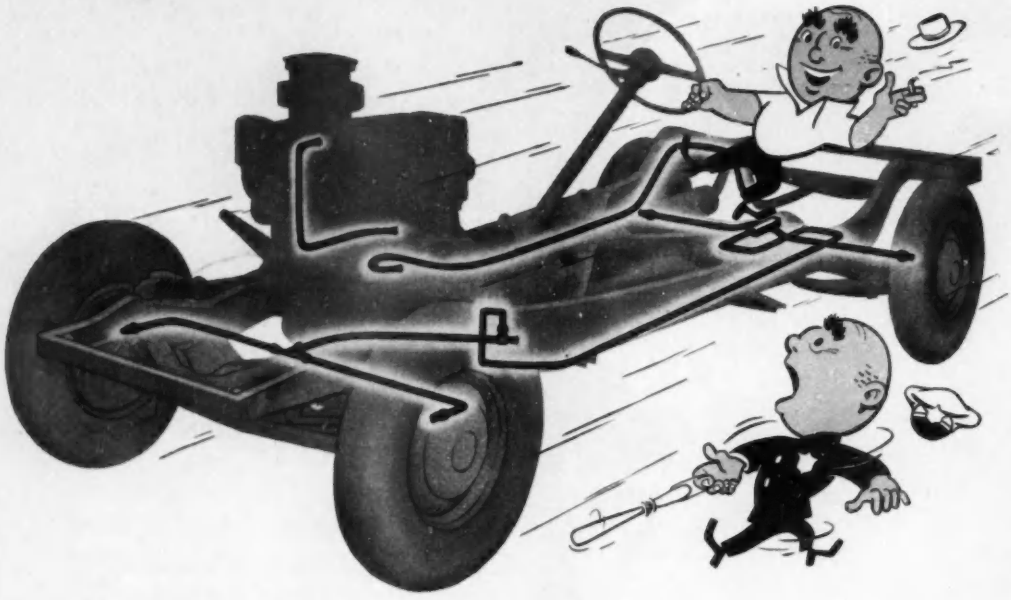
PLANTS AT MUSKEGON AND SPARTA

"THE ENGINE BUILDERS' SOURCE"



The finest lines on any car...

BUNDYWELD TUBING

OIL LINES, fuel lines and hydraulic brake lines *are* the finest lines on any car when they're of durable, double-walled Bundyweld.

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Bundyweld® Tubing

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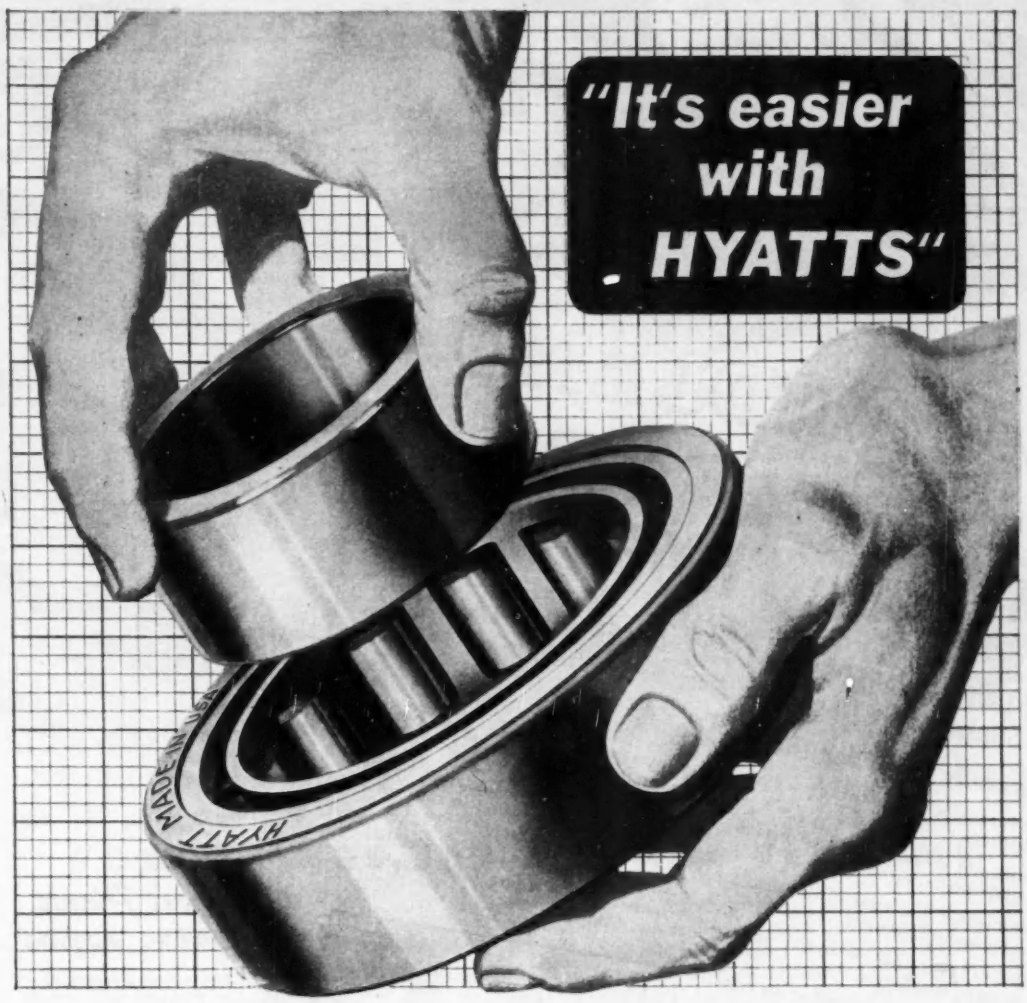

To Cut Assembly Cost

HYATT Hy-Load Roller Bearings are precision products—all separable parts are so accurately made that any inner race or outer race will fit any roller assembly of the same piece number. This eliminates selective fitting and cuts cost on the assembly line.

Automotive engineers prefer Hyatt Hy-Loads, not only because of these assembly line advantages, but because they know from experience that Hyatt design and quality add smoother operation and better road performance wherever they are used.

Everywhere you look, cars, trucks and buses are rolling on dependable Hyatt bearings. Play safe, capitalize on the experience of the automotive leaders. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey; Detroit, Michigan.

HYATT ROLLER BEARINGS

WER BRAKE DIVISION DETROIT

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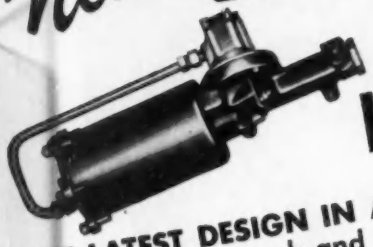
DETROIT PRESSED STEEL DIVISION DETROIT

New! MIDLAND AIR HY-POWER



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Supplied in truck and tractor air brake kits

Carefully Consider These 9 Points:

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2. Does not disturb standard brake pedal installation.
3. Eliminates foot control or treadle valve and installation.
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8. Eliminates power brake chamber bracket.
9. Does not disturb the original hydraulic brake operation in case of inadequate air pressure.

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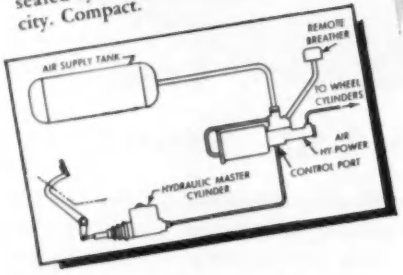

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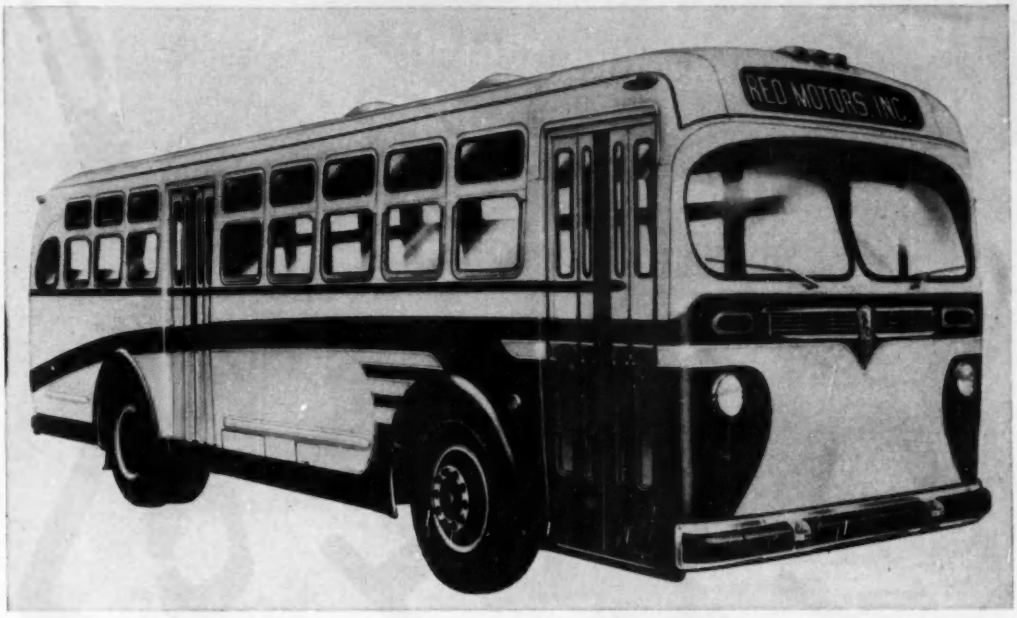

REO FLYING CLOUD TRANSIT COACH

ROSS BRINGS EASE . . . AND ECONOMY

OUTSTANDING COMFORT for passenger and driver, rates high among the advantages of the 37-passenger Reo Flying Cloud Coach, shown above . . . Likewise, Reo calls attention to the strength, combined with lightweight for economical operation, which is characteristic of Flying Cloud Coaches. The good steering in these fine coaches is supplied by Ross.

The Ross policy of incorporating advancements in design as they are proved by exhaustive tests has resulted in many recent improvements. Current Ross models have:

(1) ***Increased mechanical reduction*** . . . (2) ***More compactness*** . . . (3) ***Reduction in weight*** . . . (4) ***Greater arm angular-travel*** . . . (5) ***Improved metallurgy*** . . . (6) ***Increased efficiency***.

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Ross

Cam & Lever ***STEERING***

ROSS GEAR AND TOOL COMPANY • LAFAYETTE, INDIANA

For BETTER PARTS
to meet needs like these:

- Excluding dirt, grit, dust
- Retaining lubricants
- Thermostatic insulation
- Isolating vibration
- Cushioning shock
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Oil Rings have a mighty tough job to do in worn engines—because, actually, they must do *two* jobs—permit adequate lubrication of upper rings and cylinder walls, yet stop excessive oil consumption.

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Perfect Circle

THE MOST HONORED NAME IN PISTON RINGS

LONGER LIFE FOR DIES!

. . . plus increased production . . . and fewer rejects!

Assuming you have the finest metal-forming equipment, the best of dies, the most skillful craftsmen—there is still one variable in cold drawing of sheets, wire, rods or tubes.

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N-A-X

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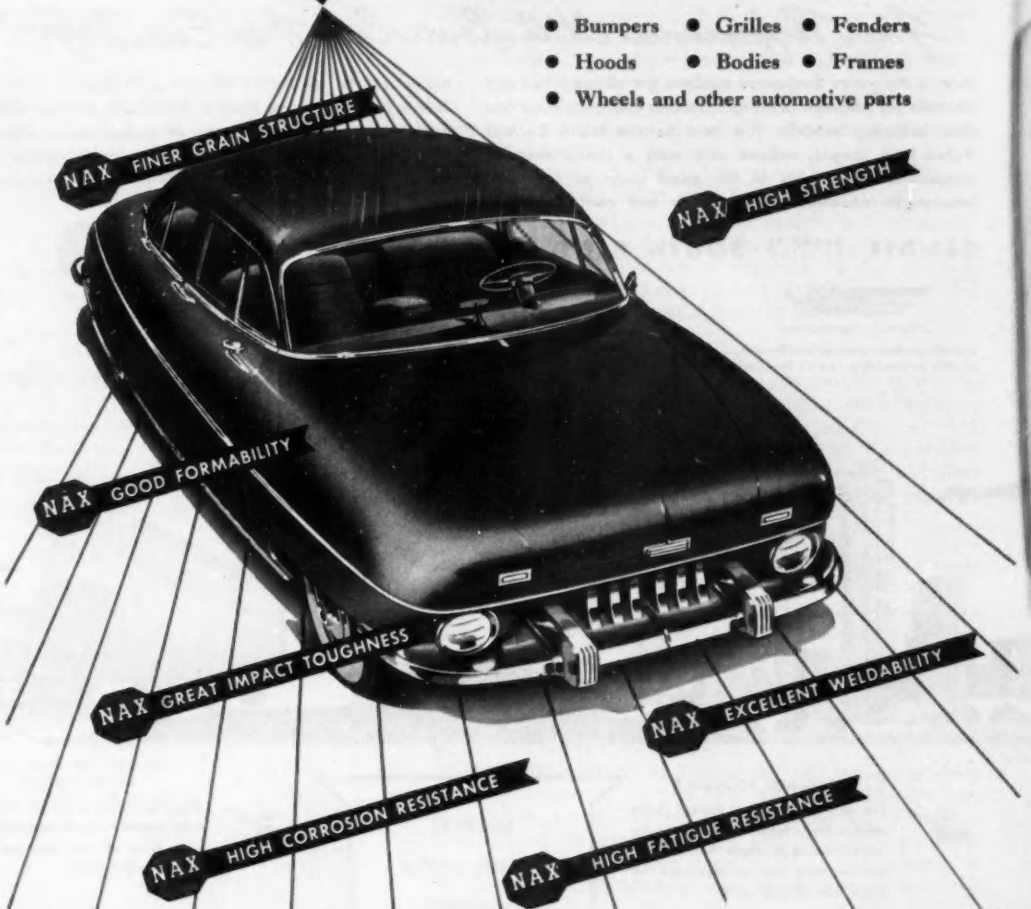

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GEARED TO QUANTITY PRODUCTION

ANNOUNCES THE *New*

BENDIX HAND CONTROL VALVE

Finer Performance At A Lower Cost Than Ever Before!

Here is the valve that gives truckers the ultimate in hand controls for vacuum braking systems—but *costs even less* than ordinary models. The new Bendix Hand Control Valve is a simple, rugged unit with a clean, modern appearance that adds to the good looks of any cab interior. Its absolute dependability and consistent precision set an all time high for performance—and at a lower cost than ever before! Available with or without an integral, easy-to-read vacuum gauge, the new Bendix Hand Control Valve assures maximum flexibility with today's vacuum trailer braking assemblies. For complete details write the factory direct.

BENDIX · PRODUCTS DIVISION · SOUTH BEND

Bendix AVIATION CORPORATION

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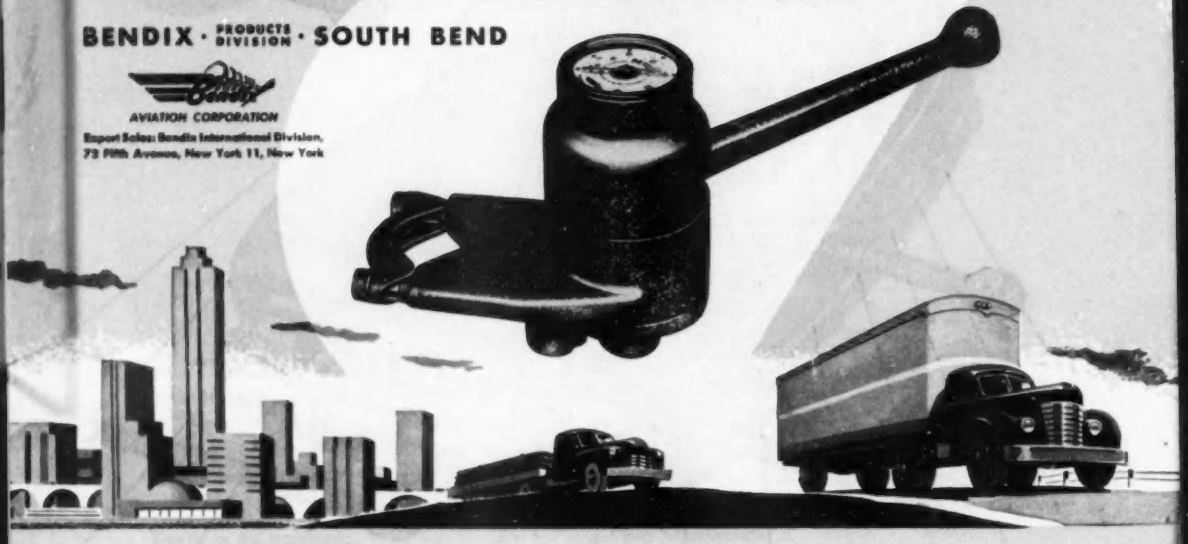

GRADUATES ACCURATELY

The new Bendix Hand Control Valve applies the brakes in amount exactly corresponding to where the handle is set—no more and no less—and the driver can depend on it.

ACTS CONSISTENTLY

Graduated braking is always the same, in application and release each time the valve is used.

BUILDERS OF THE BASICS OF BETTER MOTOR VEHICLES

HOLDS A SETTING

When the handle is left in a fixed position, there is no tendency for brakes to creep on or off—no "lookover" when the valve is seated.

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AUTOMOTIVE INDUSTRIES

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AUTOMOTIVE INDUSTRIES
Reg. U. S. Pat. Off.

High Spots of This Issue

Packard Marine Reverse Gear

Here is the first technical release of construction details and operation of the marine engine Finger-Tip Control reverse gear developed by Packard. It permits the boat propeller to turn in the same direction as engine rotation when in forward drive. See page 30.

Mass Marquenching

International Harvester spent $1 million for rearrangement and modernization of heat treating facilities at the Fort Wayne Works. Result is production of transmission gears, king pins, shafts and other parts capable of greater service life. Quenching presses, plugs and similar equipment has been eliminated through use of the mass Marquenching techniques described. Page 32.

1950 Swiss Automobile Salon

The most international, if not the biggest in Europe, was the Twentieth Swiss Automobile Show held in Geneva, with 300 exhibitors and 75 models of passenger cars in evidence. Divulged in this article is news on the offerings from the U. S., Britain, France, Germany and Italy. Page 38.

Nash Rambler and Its 82 Hp Engine

New light 2400 lb Nash Rambler powered by an 82 Hp engine has an unusual design of independent front suspension, semi-elliptic springs of conventional type at the rear, and Hotchkiss drive. In the convertible body rigidity is provided by rails above the windows and doors, as described and illustrated among other interesting features starting on page 42.

Packard's Ultramatic Transmission—Part Two

Reduction of production costs of the Ultramatic transmission has been accomplished by use of composite assemblies, pearlitic malleable iron castings for parts normally made from steel forgings, and silver brazing of the composite assemblies. These and other procedures are here described, beginning page 46.

25 New Product Items And Other High Spots, Such As:

Hot rod advancement; an Indianapolis race car having sheet aluminum frame; Fiat's new 1400 model; Lou Moore's new Indianapolis car; the all-time high of our proved oil reserves of oil and gas; the practicability of aluminum foil for packaging; 24-volt equipment for army vehicles that operates in water; and a new casting process which employs thin shell molds and cores.

News of the Automotive Industries, Page 17
For Complete Table of Contents, See Page 3

Working Together for Faster Steel Service

Here's the team that swings into action the moment you contact a Ryerson plant. From the phone girl who receives your call to the driver who delivers your order it's a team of specialists who take pride in the job of getting steel to you quickly.

As soon as we take your order, duplicate copies are rushed to every person concerned and scheduling is completed simultaneously for all departments to prevent the slightest delay. In the warehouse, experienced steel men select your requirements from certified quality stocks. Carbon, alloy and stainless steels on hand in most every size, shape and finish make it easy for you to concentrate purchases—save time and develop lower costs. Then flame-cutters flash . . . friction saws roar . . . shears and punches crash. Your steel is prepared to exact specifications and rushed to the shipping floor according to schedule. A waiting truck speeds the steel to your door.

That's Ryerson steel service—a remarkable example of teamwork that enables us to ship steel in any form, to any place, in record time. Whenever you need high quality steel—need it fast—we urge you to call our nearest plant.

PRINCIPAL PRODUCTS

CARBON STEEL BARS—Hot rolled & cold finished

STRUCTURALS—Channels, angles, beams, etc.

PLATES—Sheared & U. M. Inland 4-Way Safety Plate

SHEETS—Hot & cold rolled, many types & coatings

TUBING—Seamless & welded, mechanical & boiler tubes

ALLOYS—Hot rolled, cold finished, heat treated

STAINLESS—Allegheny bars, plates, sheets, tubes, etc.

MACHINERY & TOOLS—For metal fabrication

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI • CLEVELAND
DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO

News of the AUTOMOTIVE INDUSTRIES

Vol. 102, No. 8 April 15, 1950

Romney Predicts Vehicle Output to Equal 1949

Automobile company executives are getting increasingly bullish about the automobile market, not only for this year, but for the next four or five years. George Romney, Nash vice-president, stated recently that total production this year "should certainly be equal to, but more likely above the record 1949 total." He said that current new passenger car registrations are running 25 per cent above that of a year ago, and that a volume of automotive installment credit required will be somewhat higher than in 1949. He said that because of an expected population increase of about eight million and a reasonable motor vehicle scrappage rate, production during the next five years should average nearly five million vehicles annually.

General Motors and UAW Open Contract Talks

The UAW opened a second front against the automobile industry when it began contract talks with GM on March 29. At GM, the union is asking retirement pay of $125 a month including federal social security, a nine cent hourly wage boost, and other adjustments for a total of 31 cents an hour plus other non-economic demands, principally the union shop. It is still too early to tell whether any progress is being made.

Vehicle Production to Smash Record

Automobile and truck production during the first quarter of this year was the second highest on record for any three months period with a total of approximately 1.64 million units built in U. S. plants. That record is even more amazing when allowance is made for the loss of about 330,000 units at Chrysler during the last week in January and all of February and March because of the strike. Even without Chrysler output, the industry turned out about 16 per cent more vehicles than in the first quarter of 1949. An interesting fact is that the increase in passenger car production is even larger than the figures indicate since trucks are running behind last year by nearly 38,000. Passenger cars on the other hand are ahead of last year by more than 266,000. Projected schedules for the current three months are estimated to be set at least 10 per cent higher by some individual companies, and if Chrysler gets back into production soon the period will undoubtedly be the highest on record by a good margin, and also will bring the first half year's production to a new high. If materials and other factors are favorable, the industry by the end of June should achieve a total of more than three million units.

Ford Sells Bus Business to Marmon-Herrington

Ford has sold its bus body dies, production materials for coaches, and finished body chassis to Marmon-Herrington Co., Inc. of Indiana. The latter company will produce and sell buses similar to those previously built by Ford. Distribution will be through former dealers of Metropolitan Motor Coaches, Inc. which handled the Ford bus on a national basis since it was formed in 1947.

Nash Expands Facilities for Rambler Bodies

Nash is currently expanding its body building facilities at Kenosha, Wisc., to produce bodies for the Rambler model just introduced to the public. As part of a $5 million building and expansion program, a second story is being added

WEST COAST SPORT

European styling and construction techniques are featured in the Edwards Sports Car, built by Sterling Edwards, shown at the right supervising work on the chassis, Beverly Hills, Calif. The car is designed for use as a four-passenger vehicle, and in stripped-down form as a road racer. The car has a rigid frame, all-welded, of four in. tubing, and all four wheels are independently suspended. A Ford V-8 "60" engine, modified by the Eddie Meyer Engineering Co., developing 125 hp and with a displacement of 153 cu in., powers the car. The body is all aluminum, hand formed, and a metal top, upholstered with leather on the inside, is easily removed. The car has a wheelbase of 100 in., and an overall width of 60 in.

to a wartime aircraft engine assembly building bought by Nash from the government in 1946. The addition will add 205,000 sq ft to the company's manufacturing space which totals nearly 4.7 million sq ft, not including research laboratories and the Nash proving ground.

Nash Motors is spending $250,000 at its El Segundo, Calif., assembly plant to manufacture bodies for the new low-priced Rambler series with full scale production planned for the end of June, according to company officials. First models are expected to be completed at the El Segundo plant about May 15.

number of potential orders. Use of propane gas is not new, being used to a considerable extent by truck operators on the West Coast and by some taxi fleets.

Kyes Made General Manager of GMC Truck & Coach

Roger M. Kyes has been named general manager of GMC Truck & Coach Div. and a vice-president of General Motors. Since last October he had been assistant to Morgan D. Douglas, who is on leave of absence because of his health. Mr. Douglas has been with

new 1951 model Frazer Vagabond utility sedan. The 1951 model Kaisers are scheduled to be delivered to dealers nationally toward the latter part of April, while low-priced models, are scheduled for production in June, and will be available nationally shortly thereafter.

There is some indication that a few changes in design will be evident when the lower-priced Kaiser car appears on the market early in July. Reports indicate that a conventional upper framework will be included on the doors, rather than seating the window in a channel in the roof and door pillar as originally designed.

A POLICE SPECIAL

This new 1950 Ford Tudor model is shown equipped for police service. For Ford cars in police work (see page 24, April 1st AUTOMOTIVE INDUSTRIES), the company is now featuring a 110-hp V-8 special highway patrol engine which provides extra power, acceleration, and top speed performance. A 100-hp V-8 and a 95-hp six-cyl engine are also available for these vehicles.

Ford Reorganizes Purchasing Activity

Ford has taken another step in its decentralization program by reorganizing its purchasing activity to centralize buying responsibility and authority in the Ford and Lincoln-Mercury Divisions. The move also consolidates the central office buying staff procuring for the manufacturing divisions. Carl F. Unruh has been made director of purchasing on the staff of Irvin A. Duffy, Ford vice-president-purchasing. Under the new policy each division will buy the items purchased from outside suppliers or company manufacturing units for its own assembly plants. The central purchasing office will be responsible for items having common usage throughout the company.

Twin Coach Announces New Propane-Powered Line

The Twin Coach Co. has announced a new propane-powered line consisting of seven standard bus models of 34 to 58 passenger capacity, to be powered by Fageol Twin Coach engines with a 10 to 1 compression ratio. The engine is capable of operating at a 14 to 1 ratio if desired, and its conversion to propane operation is said to require only a few minor accessory changes. In addition to its new propane-powered coaches, Twin Coach is also offering a conversion kit which will change its postwar coaches over to propane operation.

Twin Coach has already received orders for some of the buses, and has a

GM for 35 years. Mr. Kyes joined GM in 1948 and was on the central office procurement and schedules staff until his appointment to the GMC post last October. Prior to his association with GM he had been associated with Glenn L. Martin Co., Black & Decker Mfg. Co., Empire Plow Co., and Harry Ferguson, Inc.

Price of 1951 Frazer Cut $36

The new 1951 Frazer sedans will deliver for $2359 at the Willow Run factory, including federal excise taxes, as compared with a factory delivered price of $2395 for the 1950 Frazer sedans. Kaiser-Frazer has also announced a factory delivered price of $2399 on the

Now It's Official—Willys to Build Passenger Car

Willys-Overland has confirmed reports that it will bring out a small passenger car early in 1951. The proposed vehicle will weigh about 2600 lb and will probably have a 104-in. wheelbase. The first model will be a two-door sedan seating five persons. The company announces that there will be ample baggage space under lock and key. The engine will be either the new four-cyl F-head or a six-cyl engine with even more power than the present six. Styling will be "close cropped, crisp and elegant in design with rakish looking fenders in the manner of some of the most expensive continental cars, and a front end which clearly identifies it." The car will be less than 70 in. wide across the front. Willys did not comment on the cost of tooling for the car. Approval of the new car program was given last October by the Willys board, which means that the entire project would have to be completed in 15 months.

Navy Awards $7.5 Million Contract to Grumman

The Navy has awarded a $7,536,694 contract to the Grumman Aircraft Engineering Corp. for an undisclosed number of Albatross amphibian patrol planes which are to be divided between the Navy and the U. S. Air Force.

The Army Dept. has awarded contracts totaling more than $985,000 for the supply of automotive spare parts as follows: South Western Gear Works, Houston, $151,500; Oakland Truck Sales, Inc., River Rouge, $252,600; and Chrysler Corp., Detroit, $580,944.

Dodge Offers Fluid Drive on Smaller Trucks

Dodge is now offering fluid drive as optional equipment on its ½, ¾ and one-ton model trucks. The price of the fluid drive unit is $38.

Borg-Warner 1949 Net Over $22 Million

Borg-Warner Corp. has reported a net profit of slightly more than $22 million for the 1949 fiscal year. Sales last year totaled more than $252 million, indicating a profit showing of about 8.7 cents per dollar of sales. Automotive business last year accounted for 58.6 per cent of the total.

The company has included a provocative statement in its report to stockholders covering its 1949 operations. The company says that negotiations for use of its automatic transmissions are now under way with automobile manufacturers other than Ford and Studebaker, and it seems likely that they may be adopted later in the year on cars other than Ford, Mercury and Studebaker.

Reelect Kreuser as Head of Automotive Electric Group

T. A. Kreuser, of Bendix Aviation Corp.'s Products Div., in South Bend, Ind., has been reelected president of the Automotive Electric Association. Named as vice-presidents were J. W. Potter, King-Seeley Corp., Ann Arbor, Mich., from the Manufacturer's Div.; J. A. Stephen, Auto Electric Service Co., Ltd., Toronto, chairman of the Central Distributor's Div.; and Henry E. Kipp, Hopkins and Kipp Auto-Electric Co., Akron, O., of the Service Distributor's Div. Four new members of the board of 16 were named: L. W. Martin, GM's United Motors Service Div., Detroit; W. B. Van Fleet, Briggs and Stratton Co., Milwaukee; V. E. Westerlund, Carlson and Simpson, San Diego, Calif.; and Mr. Stephen.

Dates and places for 1950 regional meetings of the Automotive Electric Association are as follows: April 18-20, San Francisco, Calif.; May 10-12, Detroit; and May 17-19, Philadelphia.

Ford Planning Construction of New Office Building

Ford has added another building project to its growing list. The company is planning to erect an 11-story office building in Dearborn to house the central staff offices and a separate adjacent six-story building for other company operating activities. It is also tentatively planning to construct a three-story building between the two larger structures to provide enclosed parking space, service facilities, cafeteria and dining room, and possibly an auditorium. Construction is expected to start on the project late this year. Another building project announced by Ford is a parts depot at Cincinnati. It will be a one-story building 546 ft long and 240 ft wide. Construction will be completed this fall.

NEW PASSENGER CAR REGISTRATIONS*

Arranged by Makes in Descending Order According to the January, 1950, Totals

MAKE	January 1950	January 1949	Per Cent of Total 1950	Per Cent of Total 1949
Chevrolet	84,582	29,946	22.25	11.01
Ford	70,349	54,756	18.52	20.19
Plymouth	43,177	35,256	11.36	13.00
Buick	27,982	25,704	7.35	9.48
Pontiac	27,124	12,619	7.14	4.65
Dodge	23,609	19,766	6.21	7.29
Oldsmobile	19,526	13,826	5.14	5.10
Mercury	17,472	9,220	4.60	3.40
Studebaker	14,346	9,167	3.78	3.39
Chrysler	12,064	9,037	3.18	3.33
Hudson	9,129	11,061	2.40	4.08
De Soto	8,387	7,635	2.21	2.82
Nash	7,543	7,885	1.98	2.91
Packard	4,127	6,079	1.09	2.24
Cadillac	2,719	6,295	.72	2.32
Kaiser	2,516	3,292	.66	1.21
Lincoln	1,694	3,582	.49	1.32
Willys	1,790	1,753	.47	.65
Crosley	510	1,063	.13	.39
Frazer	391	2,099	.10	.77
Austin	444	212	.12	.08
British Ford	72	544	.02	.20
All Others	290	493	.08	.17
TOTAL	379,902	271,182	100.00	100.00

* Data from R. L. Polk & Co. and does not include returns for Arkansas in either year.

NEW TRUCK REGISTRATIONS*

Arranged by Makes in Descending Order According to the January, 1950, Totals

MAKE	January 1950	January 1949	Per Cent of Total 1950	Per Cent of Total 1949
Chevrolet	21,580	21,096	33.27	32.78
Ford	16,980	11,565	26.02	17.98
Dodge	8,009	8,402	12.35	13.07
International	5,693	7,468	8.77	11.61
G. M. C.	4,858	4,661	7.48	7.28
Studebaker	3,278	4,272	5.05	6.64
Mack	818	808	1.26	.79
Willys—Truck	806	2,000	1.25	3.22
White	633	706	.98	1.10
Willys—Jeep	570	1,387	.88	2.16
Diamond T	406	517	.63	.80
Divco	269	280	.41	.43
Reo	251	347	.39	.54
Brockway	154	164	.24	.26
Pontiac	142	3	.22	
Autocar	113	228	.17	.35
Federal	100	119	.15	.18
Crosley	40	113	.06	.18
F. W. D.	40	33	.06	.05
Kenworth	32	34	.05	.05
Sterling	23	23	.04	.04
All Others	176	328	.27	.51
TOTAL	64,972	64,308	100.00	100.00

* Based on data from R. L. Polk & Co. and does not include returns from Arkansas in either year.

News of the AUTOMOTIVE

January Top Month for Steel to Automotive Makers

More steel was shipped to the automotive industry in January than in any previous month, according to the American Iron and Steel Institute. Automobile, truck and parts manufacturers, received nearly 1,168,000 net tons of steel in January, which was 21.7 per cent of the total estimated shipments of almost 5,482,700 tons. In all of 1949 the automotive classification received an average of 18.8 per cent of shipments, compared with 15.5 per cent in 1948.

Cross Develops New Device for Servicing Machines

A machine tool development of outstanding importance was revealed recently in the installation of transfer machines at the Chevrolet-Cleveland plant. Supplied by the Cross Co., the device consists of a large panel containing a full set of tools for servicing the Cross machines. The tools are fitted in holders and adjusted for length by means of suitable gages and ready for immediate use in replacing worn or broken tools. Down time for tool setting is said to be reduced sharply. To be announced soon is another step in this development in which the tool service panel is provided with an electrical timing system which establishes definite cycles for the useful life of each size and type of cutting tool. It includes timing dials for each type and size of tool which are manually adjusted to establish useful life in terms of hours or cycles of operation. As each timer progressively reaches the end of an established cycle, it acts to stop the operation of the entire machine. Tool setters then determine the set or sets of tools requiring replacement—by visual inspection of the timing dials—and make the replacement with minimum down time by using the preset tool holders. The establishment of the useful life of drills, taps, reamers, etc., of various sizes has been based upon data assembled from production plant experience over many years.

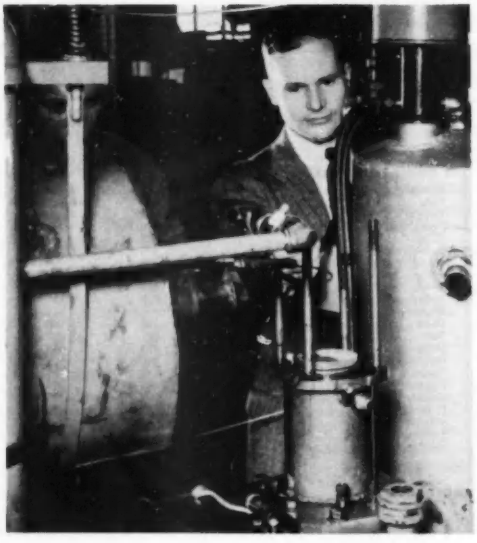
Acme

SWEDISH TRY OUT

Claes Allander (left), the designer of this new low-priced automobile, is shown trying out his new vehicle in Stockholm, Sweden. Scheduled to have a price tag of about $380, the car is expected to be placed on the market in June.

Raise Truck Tire Prices Five Per Cent

Major tire companies have raised prices of first line truck tires by about five per cent. The increase is not unexpected, and industry sources say that tire prices may go up as much as 10 per cent this year. The price of crude rubber has increased nearly 30 per cent during the last year, more than wiping out the two 3½ per cent tire price boosts made last fall. Other factors are higher prices of fabric, wage costs, and increased freight rates. Industry sources say that passenger car tires are likely to go up soon also.



HOT RING

So "hot" that it can be handled only with tongs, a radioactive piston ring is removed after one hour of use in a one-cyl test engine in the Sloan Automotive Laboratory at the Massachusetts Institute of Technology. Traces of radioactive metal from the ring will be found on the walls of the cylinder in which it has been travelling. Dr. John T. Burwell, associate professor of mechanical engineering (right), supervises these experiments as part of basic studies in the fundamentals of friction and lubrication.

Name Two Detroit Ad Execs Governors of AAAA

Carl Georgi, Jr., vice-president and director of media of D. P. Brother & Co., Inc., and Elliott Potter, vice-president, and the manager of the Detroit office of Young & Rubicam, Inc., have been elected to the Board of Governors of the Michigan Council of the American Association of Advertising Agencies.

Packard Revamps Plant Electrical System

Packard is nearing completion of its $100,000 modernization program of the electrical system at its main plant. An additional $49,000 is being spent for the latest type operating safety devices for 61 presses in the stamping division. Nine presses will be equipped with electric eyes and the rest with dual control switches to assure the greatest possible safety. The company has announced the appointment of Woodrow W. Wilson as safety engineer.

Int'l Harvester Announces New School Bus Chassis

International Harvester Co.'s motor truck div. has announced a new Schoolmaster series of school bus chassis (see cut on this page) ranging in GVW from 12,500 lb to 24,000 lb. The five Schoolmaster chassis introduced are as follows: L-153 (GVW, 12,500 lb), available in 154 and 172-in. wheelbases, accommodates 15 to 19-ft bodies, seating 30 to 42 pupils; L-163 (GVW, 15,500 lb), available in 172 and 190-in. wheelbases, accommodates 16 to 21-ft bodies, seating from 36 to 48 pupils; L-173 (GVW, 17,500 lb), available in 190 and 208-in. wheelbases, accommodates 20 to 23-ft bodies, seating from 42 to 54 pupils; L-183 (GVW, 19,500 lb), available in 208, 226, and 244-in. wheelbases, accommodates 23 to 28-ft bodies, seating from 48 to 66 pupils; and the L-193 (GVW, 24,000 lb), available in 226 and 247-in. wheelbases, accommodates 25 to 28-ft bodies, seating from 54 to 66 pupils. The Silver Diamond, the Super Blue Diamond, and the Super Red Diamond engines, all six-cyl, valve-in-head engines, power the models of the Schoolmaster series.

Automobile Installment Credit on Increase

Outstanding automobile finance credit continues to rise in the wake of heavy automobile sales. According to latest estimates, automobile credit this year is expected to increase to about $4 billion, an increase of approximately $900 million and nearly double the rate of increase for installment credit on other types of goods. It is expected that total outstanding credit by the end of the year will be just short of $21 billion.

1950 Cars More Efficient Than Prewar Models

That 1950 cars are more efficient than prewar models is the conclusion made by E. J. Sanders, automotive consultant, General Petroleum Corp., in an analysis of the results of the recent Mobilgas Grand Canyon Economy Run (see page 15, March 1st issue of AUTOMOTIVE INDUSTRIES), which was held Feb. 15-16. For example, a compilation of the data obtained during the run is given in the following table, and the comparison between the present averages with some of those obtained in prewar runs is most interesting. It should be noted that during 1936 to 1940 the runs were made from Los Angeles to Yosemite National Park, Calif., a distance of 401 miles as compared to 751 miles for the 1950 run to Grand Canyon, Ariz. The average speed in prewar runs was somewhat lower, being closer to 31 mph. The 1941 run was made to Grand Canyon by a somewhat different route than that used in 1950; however, the speed was approximately the same.

A review of the data indicates that in 1950 approximately the same ton miles per gallon were achieved as in some of the early runs, but at a speed of approximately 10 mph greater, indicating a considerable improvement in efficiency. A further point of interest is the fact that in 1941 the average mpg was 22.5 with a ton-miles-per-gallon average of 48.2. In 1950 the mpg average was 22.07, with a ton-miles-per-gallon average of 50.3, indicating a considerable improvement in efficiency, particularly in the heavier automobiles.

COMPARISON OF ECONOMY RUNS

Year	No. of Cars	Course	Average mph	Average mpg	Average Ton Mi/Gal*
1936	30	Yosemite	——	22.47	45.22
1937	23	Yosemite	32.98	20.81	46.00
1938	26	Yosemite	——	22.89	47.72
1939	29	Yosemite	28.71	22.37	46.54
1940	28	Yosemite	30.32	22.96	49.38
1941	23	Grand Canyon	43.01	22.50	48.19
1950	31	Grand Canyon	41.47	22.07	50.29

* Weight of the car, multiplied by the length of the course, divided by the number of gallons consumed, equals ton-miles-per-gallon.

Willys Makes Price Cut on New 1950 Models

Willys-Overland has announced substantial price reductions ranging from $40 to $120 on its most popular models. The only models not reduced in price are the sedan delivery, civilian Jeep, and four-wheel drive station wagon. The price of the new ½ ton truck just announced is $1220, FOB, Toledo. Dealer discounts have been increased two per cent to 24 per cent. The company now has about 2350 dealers and 86 distributors.

Ford Sets Up Fund for Civic Aid

The Ford Motor Co. has taken a big step forward in its community relations program with the formation of the Ford Motor Co. Fund, chartered as a charitable non-profit organization. Financed principally from contributions by Ford Motor Co., the fund will make contributions to organizations operating exclusively for charitable, scientific, literary, or educational purposes.

SCHOOLMASTER FOR SCHOLARS

This new school bus is built on the new L-163 Schoolmaster bus chassis which is one of a series of five announced by the motor truck division of the International Harvester Co. The five Schoolmaster chassis range in GVW from 12,500 lb to 24,000 lb accommodating various bodies seating from 30 to 66 passengers.

U. S. Car Makers Head List of Turin Show Exhibitors

American passenger car manufacturers head the list of exhibitors at the show to be held in Turin, Italy, from May 4 to 14, with the following 14 makes to be shown: Buick, Cadillac, Chevrolet, Crosley, Chrysler, Dodge, Ford, Hudson, Kaiser-Frazer, Mercury, Nash, Packard, Studebaker, and Willys-Overland. There are 13 British makes of passenger cars, seven Italian makes,

Acme

FUEL ON THE WING

Called the Fouga Cyclone, this light one-place French jet airplane has a cruising speed of 150 mph and a maximum speed of 300 mph. Equipped with fuel tanks at the wing tips, it was developed by two French fliers, Marcel Doret and Fred Nicole, and may be manufactured in the United States.

two from France, and one from Germany. Comprising trucks, coaches, bodies and accessories, the total number of exhibitors exceeds 300. First postwar models will be disclosed by Lancia and Alfa Romeo. The postwar Fiat model was shown at Geneva.

Marvel-Schebler to Move from Flint to Illinois

Borg-Warner early next fall will move all its manufacturing and administrative activities of its Marvel-Schebler Carburetor Div. from Flint to Decatur, Ill. Improvements and alterations will be made on a 135,000 sq ft plant which the company has leased and will include construction of an engineering laboratory.

Aeronca to Produce New Helioplane

A combination helicopter-airplane called the "helioplane," will be manufactured by the Aeronca Aircraft Corp., Middletown, O., plant officials have announced. President John Lawyer said that a limited number of the planes will be available by late summer.

Bendix-Westinghouse Air Brake Builds New West Coast Plant

The Bendix-Westinghouse Automotive Air Brake Co., Elyria, O., has announced the construction of a new plant at Berkeley, Calif., containing about 20,000 sq ft of floor space for sales and service and warehousing of new parts, as well as production equipment for rebuilding air brake units. The building will be ready for occupancy on or about May 1, 1950.

Goodyear Pension Plan to Cost $6.4 Million

Goodyear Tire & Rubber Co. stockholders have approved a new pension plan for both salaried and hourly-rated employes which will cost an estimated $6.4 million a year. The pension agreement provides for minimum pensions of $100 a month, including social security for employes retiring at 65 with 25 years' service.

Nash Names Huntress Advertising Head

Nash has appointed J. B. Huntress as advertising manager and has named S. W. Williamson, formerly manager of sales training, to the post of sales promotion manager. Mr. Huntress was formerly assistant advertising manager.

Reo Loss Last Year Nearly $2 Million

Reo Motors, Inc., has reported a loss of $1,968,316 for 1949. The previous year Reo earned a net profit of $110,000. Sales last year dropped to $23.2 million from $38.3 million in 1948.

New Replacement Standards for Government Trucks

Officials in charge of motor vehicle operations in the various government agencies have under discussion a table of minimum replacement standards for commercial standard trucks varying from 17,000 lb GVW to 28,500 lb GVW. Replacement standards for passenger cars and trucks up to 15,000 lb GVW are already in effect. These standards, prepared by the Interdepartmental Motor Equipment Committee of the Budget Bureau, will probably become effective within a matter of weeks. The proposed replacement standards are as follows:

Maximum GVW (lb)	Total Years	Total Miles
17,000	7	60,000
20,500	8	65,000
24,500	9	71,000
28,500	10	80,000

Covering the medium class of commercial vehicles, these standards along with those already in effect, will blanket the major portion of the vehicles operated by civilian agencies of the government. The truck standards do not cover construction vehicles, such as dump trucks, which are conceded to be in a special category. Additional

1950 MOTOR VEHICLE FACTORY SALES FROM U. S. PLANTS*

	Passenger Cars	Trucks	Buses	Totals 1950	Totals 1949
January	467,854	93,622	219	561,695	431,278
February	365,025	89,668	133	474,826	426,663
Total—Two Months	872,879	183,290	352	1,056,521	857,941

1950 FACTORY SALES TO DOMESTIC AND FOREIGN MARKETS*

	Passenger Cars		Trucks		Buses	
	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign
January	475,496	12,358	84,354	9,268	194	25
February	377,185	7,840	80,939	8,729	128	5
Total—Two Months	852,680	20,198	165,293	17,997	322	30

* Automobile Manufacturers Association.

standards for heavier commercial standard trucks will probably be promulgated eventually.

Packard Puts Ultramatic on 85% of Production

Packard announces that 85 per cent of its cars built so far this year have been equipped with Ultramatic drive. The price of the automatic transmission was reduced from $225 to $185 early in January. Early this year Packard had scheduled approximately 70 per cent of all this year's production to be equipped with the Ultramatic drive, and during January 100 per cent of output was built with the Ultramatic transmission.

Chevrolet DeLuxe Models Outsell Standard 3 to 1

Chevrolet has come up with some interesting figures showing that the automobile market basically is still very strong. W. E. Fish, general sales manager, says that 74 per cent of the passenger cars sold last year were in the higher-priced de luxe series.

Willys Appoints Venn General Sales Head

William S. Venn, a veteran in automotive retail trade circles, has been named general sales manager for Willys-Overland Motors. He succeeds Howard O. Lund who has resigned because of illness.

International Car Show at Chicago Trade Fair

To be held in Chicago from Aug. 7-20, an international automobile show will be featured at the First United States International Trade Fair. Between 30,000 and 40,000 sq ft of space has been set aside for the automotive division of the Fair.

Mercury Chosen to Pace 1950 500-Mile Race

Ford's Lincoln-Mercury Div. will provide the pacemaker car for the 1950 500-mile Indianapolis Race. It will be a stock Mercury convertible and will be driven by Benson Ford, L-M general manager.

Berger Joins Kaiser-Frazer as Aide to Sales Chief

Kaiser-Frazer has announced appointment of E. W. (Erv) Berger as assistant general sales manager. Mr. Berger had been sales executive of Chevrolet for 20 years. He will direct work of the national field sales organization, working closely with dealers and distributors in the introduction of 1951 Kaiser and Frazer models.

Public Wants More Power—Likes Style of Nash NXI

Nash has received some interesting replies to its questionnaire to the public dealing with its small experimental NXI automobile. Generally there is a definite preference for the larger engine, a somewhat longer wheelbase, wider tread, a single front seat instead of two individual seats, and provision for an auxiliary two passenger seat in the rear compartment. The styling of the car has met with general approval.

General Tire to Build Plant in Israel

General Tire & Rubber Co. has joined the list of American manufacturers who will build plants in Israel. The company will erect a $2 million plant to produce between 80,000 and 100,000 tires and an equal number of inner tubes annually. It is expected to be completed early next year.

Fruehauf Appoints Two New Vice Presidents

Roy W. Jacobs and Roy L. Warren, both long identified with Fruehauf Trailer Co., have been elected vice-presidents. Mr. Jacobs will continue to act as secretary and Mr. Warren will continue as director of purchases.

GM Canadian Unit Gives UAW 8¢ an Hour Wage Hike

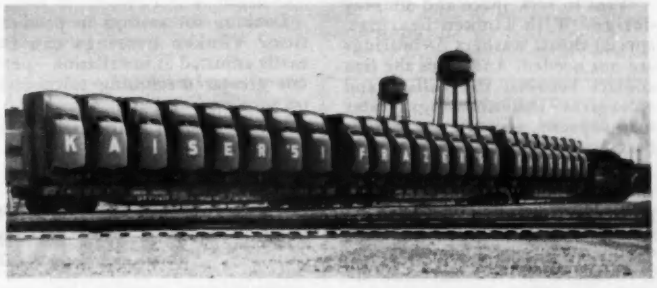
GM's McKinnon Industries, Ltd., St. Catharines, Ont., Canada, and the UAW-CIO have signed an agreement providing wage boosts of up to eight cents an hour for the company's 3000 employes. The increases, retroactive to March 23, include an eight-cent hike for all day workers and for piece workers paid on day rates; a seven-cent raise in objective rates for piece workers and in base rates for group bonus workers.

Rockefeller Group Gets Control of Marquardt Aircraft

Laurence S. Rockefeller and a group of investors have acquired the controlling stock interest in Marquardt Aircraft Co. from General Tire & Rubber Co. In addition to retaining his position as president, Roy Marquardt will serve as chairman of the board. Mr. Rockefeller will be represented on the Marquardt board of directors by Harper Woodward, his legal counsel and advisor on aviation.

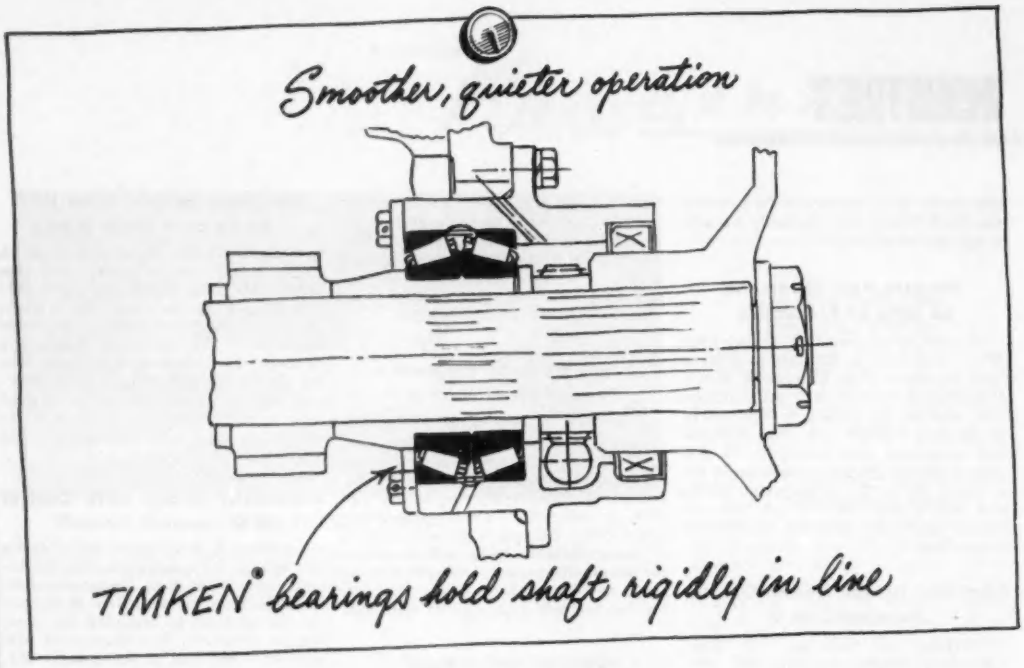
Nash Expects 1950 to be Record Year

George W. Mason, president of Nash, has informed stockholders that the current fiscal year which ends Sept. 30 should be one of the most prosperous in the company's history. He said that this should be true even though earnings in the first half of 1950 will be somewhat lower than during the same period last year because of limited production and higher costs resulting from steel and coal strikes. He said that field stocks of cars are conservative, and that demand is excellent.



DOUBLED BY A PINWHEEL

In cooperation with the Union Pacific Railroad, Kaiser-Frazer is using these special freight cars to deliver completed "bodies-in-white" to the K-F assembly plant at Long Beach. An unusual "pinwheel" mounting arrangement permits loading of 16 bodies to the car, with eight bodies riding upright in two parallel rows—double the capacity of conventional freight cars.



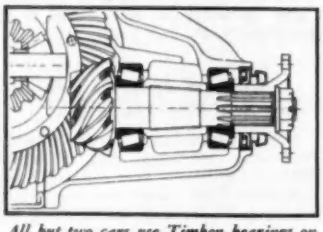
How to get ideas rolling smoothly in your secret transmission

NO matter what problems you may face in planning your new transmission, Timken® bearings can help to get your ideas rolling smoothly—from design stage right through to actual operation on the road.

Want to provide for thrust as well as radial loads? Due to their tapered construction, Timken bearings carry both—in any combination!

Want to save space and simplify design? With Timken bearings, special thrust washers or bearings are not needed. And since the line contact between the rollers and races gives Timken bearings greater load capacity, you can use smaller bearings.

Want accurate meshing of gears and perfect alignment of moving parts? Timken bearings give shafts greater support, help to keep them rigidly in line, with minimum deflection and end-movement. Gears mesh smoothly.



All but two cars use Timken bearings on the pinion. Here's a typical application.

Looking for savings in production? Timken bearings can be easily adjusted at installation—permit greater machining tolerances on surrounding parts.

Using Timken bearings in your new transmission is one way to help assure smooth, trouble-free operation. For proof of performance, look at the record of Timken bearings on pinions. Today all but two American cars use Timken bearings for this tough bearing application.

Get help with your bearing problems from our engineering staff. In Detroit, phone TRinity 5-1380. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

NOTE TO P.A.'S *Because every step of the manufacture of Timken bearings is controlled within our company . . . because our vast manufacturing facilities are widely dispersed . . . you will find The Timken Roller Bearing Company a supply source of outstanding reliability.*

TIMKEN
TRADE MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

NOT JUST A BALL ◯ NOT JUST A ROLLER ⊂⊃ THE TIMKEN TAPERED ROLLER ⊂⊃ BEARING TAKES RADIAL ◯ AND THRUST →◯← LOADS OR ANY COMBINATION →✳←

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers.

Nash Motors Div., Nash-Kelvinator Corp.—**J. B. Huntress** has been named Advertising Manager and **S. W. Williamson** has been advanced to Sales Promotion Manager.

General Motors Corp. — **Roger M. Kyes** has been appointed General Manager of the GMC Truck & Coach Division.

Ford Motor Co. — **Harrison Smith**, former assistant Chester District sales manager has been named to the newly-created post of Asst. Sales Manager—City and placed in charge of Ford dealer activities in metropolitan Philadelphia.

Lincoln-Mercury Div., Ford Motor Co. —**Robert W. Straughn** has been appointed National Merchandising Mgr. for new cars.

Buick Motor Div., General Motors Corp.—Announcement has been made that **Waldo E. McNaught** will be in charge of Buick Public Relations.

Packard Motor Car Co.—The appointment of **W. W. Wilson** as safety engineer has been announced.

The White Motor Co.—**H. N. Mallon** has resigned as a director of the company and **John O. Ekblom**, of New York City, has been elected to fill the vacancy.

Willys-Overland Motors, Inc. — The appointment of **William S. Venn**, as General Sales Manager, has been announced.

Reo Motors, Inc.—**Joseph Schroeder** has been made manager of the Reo Lansing branch.

Kaiser-Frazer Corp. — The appointment of **Gareth W. Speer** as Asst. Treasurer has been announced. **E. W. Berger** has been named Asst. General Sales Manager.

Mack Trucks, Inc.—**A. F. Fenner**, Vice-President of Mack International Motor Truck Corp., has been named General Sales Manager, with headquarters in Chicago. **P. J. Degon** has been named Manager of the company's newly created Eastern Sales Div.

The Electric Auto-Lite Co. — **Joseph A. Cappi** has been elected a Vice-President and will serve in the Production Div.

Borg-Warner Corp. — The appointment of **C. M. Baker** as Chief Engineer, has been announced.

E. I. duPont deNemours & Co.—The following personnel changes in the Rayon Dept., coincident with the establishment of the Film Dept. from the present Cellophane Div. have been announced: **Donald F. Carpenter** has been named General Manager of the new Film Dept.; **Willis Shackelford**, of the Cellophane Div., is taking an extended leave of absence. **Robert A. Ramsdell** becomes a special assistant to the Rayon's Dept.'s general management. **Dr. George W. Filson**, manager of the Acetate Div., succeeds Mr. Ramsdell as Manager of the Nylon Div.; **Dr. G. Preston Hoff**, manager of the Technical Div., succeeds **Dr. Filson** as manager of the Acetate Div. **Dr. Winfield W. Heckert**, assistant manager of the Technical Div., becomes Manager of that division. **Dr. Lester S. Sinness** succeeds D. Heckert as Asst. Manager of the Technical Div.

Walker Mfg. Co.—**John L. Engels**, former manager of the Chicago Sales District, has been appointed Vice-President and Sales Manager of the Distributor Div.

Illinois Tool Works — The company has announced the opening of an Eastern Sales Office for the Shakeproof, Inc. Division and the appointment of **Russell W. Bill** as Eastern Sales Manager.

Aeronca Aircraft Corp.—**H. C. Pettit** has been appointed Sales Manager, succeeding **Walton B. St. John**, who is leaving the company.

Marmon-Herrington Co., Inc. — The promotion of **Fred B. Croner** to a Vice-Presidency of the company, in charge of procurement, has been announced. **George H. Freers** has been made Vice-President in charge of engineering.

Federal Motor Truck Co.—**Walter L. Hayes** has been made Asst. General Sales Manager with headquarters in Detroit. **Harry L. Norton** has been named truck distribution manager and will serve on Mr. Hayes' staff.

Link-Belt Co. — **David E. Davidson** has been elected Vice-President for Sales, with headquarters in Chicago. **Eugene P. Berg** has been appointed General Manager of the Pershing Road plant, to succeed Mr. Davidson.

(*Turn to page 67, please*)

CALENDAR

OF COMING SHOWS AND MEETINGS

Conventions and Meetings

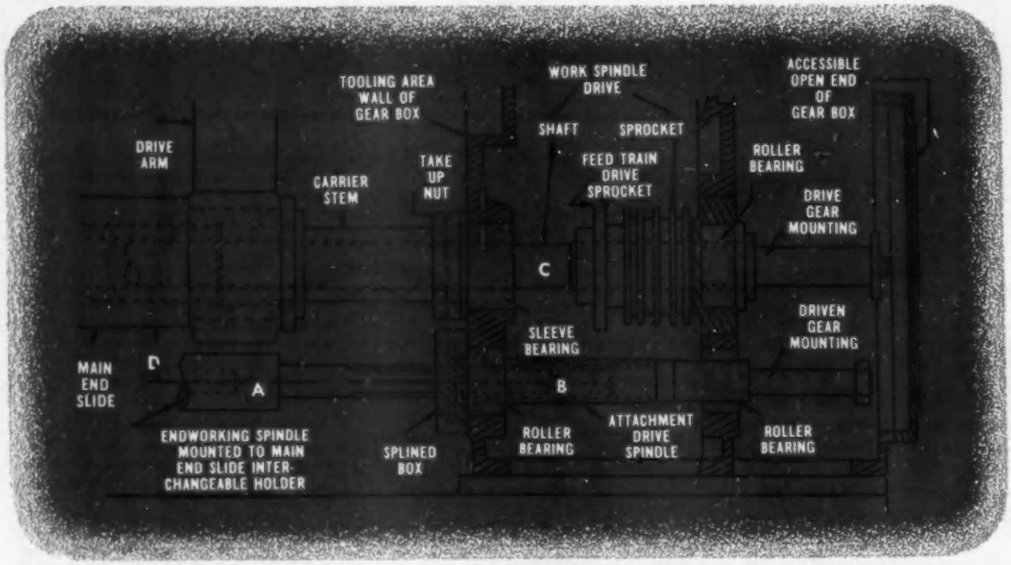
Society of Motor Mfrs. & Traders British Auto. & Motorcycle Show, New York City .....Apr. 15-23
SAE Aeronautic & Aircraft Eng. Display, New York City.....Apr. 17-19
Nat'l Packaging Exposition, Chicago Apr. 24-28
Metal Powder Assoc. Annual Metal Powder Show, Detroit.....Apr. 25-26
Westinghouse Mch. Tool Electrification Forum, Buffalo.....Apr. 25-26
3rd Highway Transportation Congress, Washington .....Apr. 25-27
Chamber of Commerce of the United States Annual Mtg., Washington, D. C. .....May 1-3
International Motor Show, Turin, Italy .....May 4-14
Mid West Automotive Show, Chicago .....May 11-14
Automotive Engine Rebuilders Assoc. Annual Convention, St. Louis.May 18-19
Soc. for Exper. Stress Analysis, Cleveland .....May 25-27
International Trade Fair, Toronto May 29-June 9
Amer. Society for Quality Control, Fifth Midwest Conference-Annual Convention, Milwaukee, Wis...June 1-2
Amer. Gear Mfrs. Assoc., Hot Springs, Va. .....June 4-7
SAE Summer Mtg., French Lick..June 4-9
Amer. Electroplaters' Soc. Convention, Boston .....June 12-16
Amer. Soc. Mech. Engineers, Nat'l Mtg., Chicago .....June 12-16
Nat'l Truck, Trailer & Equip. Show, Los Angeles .....June 22-25
A.S.T.M. Annual Mtg., Atlantic City June 26-30
International Trade Fair, Chicago.Aug. 7-19
SAE Nat'l West Coast Mtg., Los Angeles .....Aug. 14-16
SAE Tractor Mtg., Milwaukee.....Sept. 11
Nat'l Assoc. Motor Bus Operators Annual Mtg., Chicago.....Sept. 13-15
Instrument Soc. of Amer. Conf. & Exhibit, Buffalo .....Sept. 18-22
SAE Nat'l Transportation Mtg., New York City .....Oct. 16-18
Nat'l Safety Congress, Chicago. Oct. 16-20
Society of the Plastics Industry Nat'l Conference, Swampscott, Mass. Oct. 18-20
Amer. Society for Metals' Annual Nat'l Metal Congress & Exhibition, Chicago .....Oct. 23-27
Amer. Welding Soc. Annual Mtg., Chicago .....Oct. 23-27
Nat'l Lub. Grease Inst., Chicago Oct. 30-Nov. 1

Necrology

Maurice J. Mulligan, 50, senior research chemist, GM's Research Laboratories Div., died in Detroit on April 2.

John Robert Hunt, 65, former secretary-treasurer and director, Rolls Royce Corporation of America, the Rolls Royce-Brewster Corp., and the Brewster Aeronautical Corp., died in Mineola, N. Y., on April 3.

Alphonse O. Rousseau, 61, Abrasive Products Safety Engineer, Norton Co., Worcester, Mass., died March 27.



BEWARE OF THE BAR IN BARGAIN

With manufacturing costs much the same the country over, the purchase prices of various brands of a given type of machine tool should be about equal for equal value. Healthy competition tends to level out prices.

All of the best facilities of the highest priced machine may not be needed, and should not be expected of the lowest priced machine. The value of any brand depends on how well its facilities meet the particular needs of the individual plant.

Of all required facilities, those of low-cost operation and maintenance are universally considered important. A machine without them is a BAR to any GAIN at any PRICE.

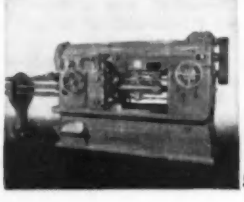
An example of **LOW-COST OPERATION AND MAINTENANCE FACILITY** is the **EXCLUSIVE** Conomatic **"ALL POSITION" END ATTACHMENT,** which has:

1. **Direct Drive to ANY Rotating Tool, in ANY or ALL SIX, Main End Slide Positions. Solid Tapping in ANY THREE Positions on ONE Set-up. Die Head Swing, D, clears COLLET CAPACITY in ANY Position.**

The above drawing shows Endworking Spindle, A, in a Main End Slide Position of a 1½" SIX SPINDLE Conomatic. Its splined shaft is rotated by the Attachment Drive Spindle, B. The drive from the Work Spindle Drive Shaft, C, is indicated. The Spindle, A, rotates in its bearing in an interchangeable Holder mounted to the Main End Slide, whose travel it may take. Three levers and cams offer independent travel to any three Endworking Spindles per single set-up.

2. **Accessible OPEN-END Application and INTERCHANGEABLE Attachment HOLDERS. Selective Speeds and Feeds.**

Six Attachment Drive Spindles may be applied to one set-up. Two are machine equipment. There is drive facility for 168 Speeds between 132 and 6158 RPM for drilling, boring, etc. Std. Drive Gears offer 10 Threading Speed Ratios.



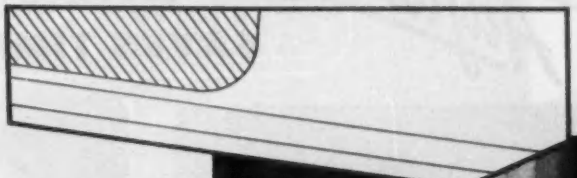
Buyer's Comparison Chart will guide you to full information

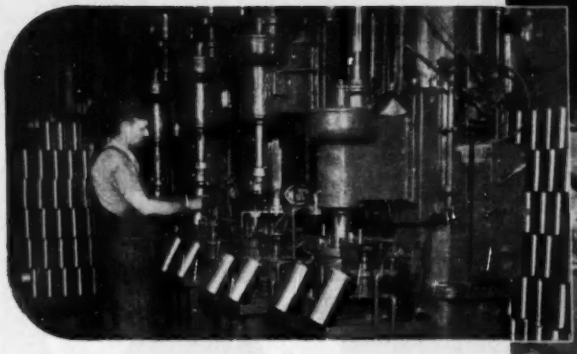
A Comparison of ALL Automatics is in Favor of Cone

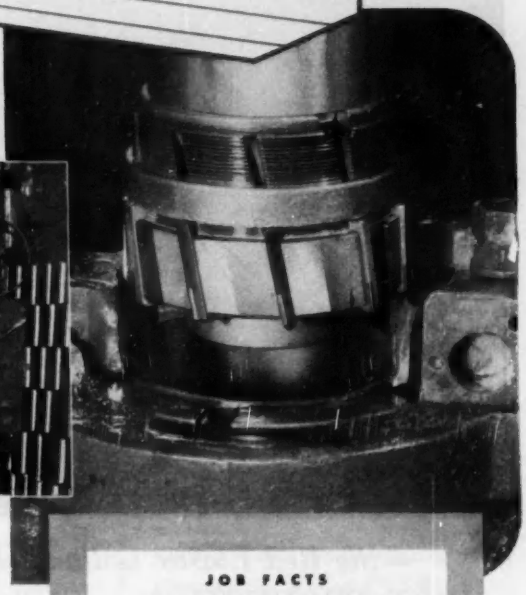
5 **Conomatic** CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.

BARBER-COLMAN *Design* SAVES 15% TOOL COST

ON CARBIDE-TIPPED REAMERS FOR CYLINDER LINERS







JOB FACTS

Operation — Finish ream cylinder liners
Material — Cast Iron, 45-55 R.C.
Stock Removed — .018"
Tool Life — 108 pieces per sharpening, formerly obtained 95
Feed per Rev. — .087" Speed — 40 RPM
Tool Cost — Per 100 pieces, reduced from $1.57 to $1.32

These Barber-Colman Inserted Blade Reamers are producing truck cylinder liners with accurate, straight, round holes, free from welts or taper, at a tool cost of 15% less than previous records. Material reamed is cast-iron.

Replaceable blades with carbide-tips give long life to the reamers, and cutting edges which stand up under continuous production. 675 more pieces per set of blades are now obtained, and tool cost per 100 liners has been reduced from $1.57 to $1.32.

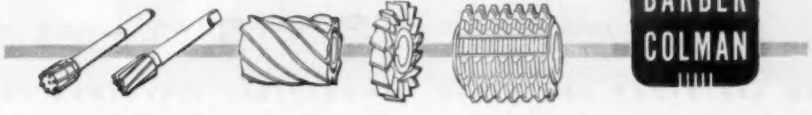
When you want dependable low cost production from the cutting tools used on your machines, specify "Barber-Colman JOB-ENGINEERED".

FREE!

Write for additional Data Sheets covering other reaming applications. Ask for Series No. 9816.

Barber-Colman Company

GENERAL OFFICES AND PLANT, 9816 LOOMIS ST., ROCKFORD, ILLINOIS, U. S. A.



BARBER COLMAN

Clutch Adjustment

WITH ONE HAND SAVES TIME... MONEY

—*the Red Elastic Collar helps* JUMP PRODUCTION... CUT COST!

The nut and jam nut combination formerly used on the clutch adjustment rod of the Hystaway—tractor-mounted excavator manufactured by the Hyster Company at Portland, Oregon, had two disadvantages: (1) two wrenches were required to adjust the clutch (one to hold the first nut, and one to loosen and reset the jam nut); and, (2) it was difficult to get two hands through the limited frame opening.

After exhaustive experimentation, the Company adopted Elastic Stop Nuts. Now clutch adjustment can be made quickly, easily and *exactly—with one hand.*

Further, since Elastic Stop Nuts lock in position anywhere on a bolt or stud, only one adjustment is usually necessary—the first. Once this adjustment is made, the Red Elastic Collar maintains that precise setting permanently. Neither vibration nor impact will shake the nuts loose. Also, Elastic Stop Nuts keep bolt and nut threads rust-free . . . seal against liquid seepage along bolt threads . . . do not damage the threads. And, of course, Elastic Stop Nuts are re-usable.

HERE'S A CHALLENGE: Send us complete details of your toughest bolted trouble spot. We'll supply test nuts—FREE, in experimental quantities. Or, if you want further information, write Elastic Stop Nut Corporation of America, Union, N. J. Representatives and Agents are located in many principal cities.

ESNA

THE FAMOUS RED ELASTIC COLLAR IS VISIBLE EVIDENCE OF LOCKING SECURITY

Threadless and permanently elastic, it provides these 4 outstanding features:

1. Protects against nuts loosening due to VIBRATION
2. Keeps locking threads CORROSION FREE
3. Provides for accurate BOLT LOADING
4. Seals against LIQUID LEAKAGE along the bolt threads

ELASTIC STOP NUTS

HIGH TENSILE

ANCHOR

WING

SPLINE

CLINCH

GANG CHANNEL

NYLON CAP

OVER 450 TYPES AND SIZES IMMEDIATELY AVAILABLE FROM STOCK

How Thin Can a Head Gasket Be for High Compression Sealing?

VIC-2-FOLD

TRADE MARK

The Thinnest Practical Metal-Asbestos Construction . . . Compressible to .040 Average

Fully effective on Valve-in-head or L-head engines

With VIC-2-FOLD gaskets, you can meet the exacting requirements of modern high-compression engine head sealing. VIC-2-FOLD is the thinnest practical construction for a compressible metal-encased asbestos gasket. On the engine, it compresses to .040" average.

VIC-2-FOLD design combines the high breakdown resistance of steel and the corrosion-resistance of copper. The overlap forming of the VIC-2-FOLD gasket case, as detailed at right, takes maximum advantage of each of these metals.

Superior General Purpose Gasket at Moderate Cost

Not only does VIC-2-FOLD excel standard gasket construction for flexibility, but has adequate compressibility for positive sealing in all applications. Thorough dynamometer testing shows that VIC-2-FOLD has all desirable features of a general purpose gasket, and is equally suited for Valve-in-head or L-head engines, in gasoline or diesel service.

Complete Technical Data Supplied on Request

Ask your Victor Field Engineer to give you the full details on VIC-2-FOLD gaskets. No obligation. Or, if you prefer, send your inquiry direct to the Engineering Dept., Victor Mfg. & Gasket Co., P. O. Box 1333, Chicago 90, Ill.

Section across combustion opening showing the VIC-2-FOLD construction

Note how bottom layer of steel is formed up in combustion chamber openings, and overlaps asbestos filler and top layer of copper, thereby utilizing the high strength of steel against breakdowns and blowouts.

Similarly in coolant openings, the top layer of copper is formed down and overlaps the asbestos filler and bottom steel layer. This utilizes the high corrosion resistance of copper in contact with coolants and anti-freeze solutions.

Asbestos filler is of the finest quality, precision milled and composed in Victor's own plant.

SEALING PRODUCTS Exclusively

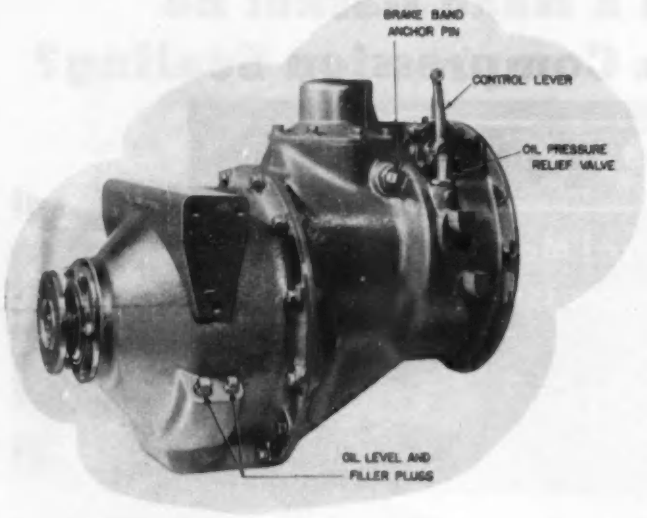
VICTOR GASKETS AND OIL SEALS

VICTOR

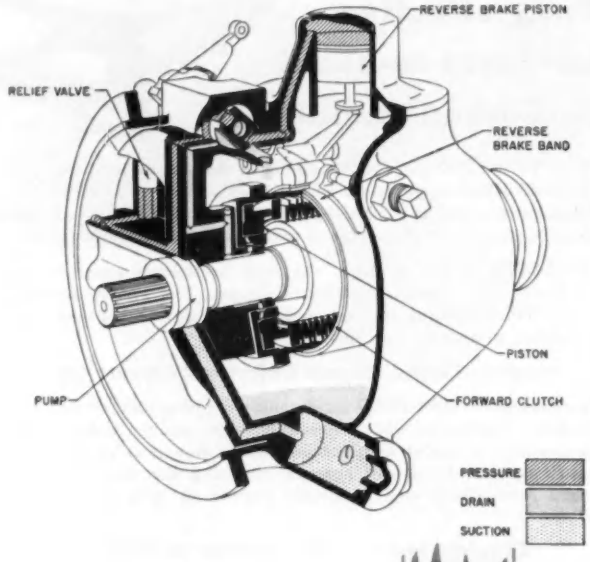
GASKETS · OIL SEALS

Construction and Operation of

By Joseph Geschelin



Right side view of Packard marine reverse gear unit, showing control lever at the top.



Cutaway drawing of reverse gear showing path of fluids, flow in reverse maneuver.

ALTHOUGH exhibited several years ago (see AI, April 1, 1947), this constitutes the first technical release of constructional details and operation of the marine engine Finger-Tip Control reverse gear developed by the Packard Motor Car Co. Recognizing that the requirements of modern boat operation demand an ability to run the engine at its most efficient speed while maintaining correct propeller speed with lowest slip, the Packard reverse gear is offered in a choice of direct drive or the following reduction gear ratios: 1.45 to 1, 2.04 to 1, 2.52 to 1, and 3.55 to 1.

An additional feature of the installation is that the propeller turns in the same direction as engine rotation when in forward drive, this effect resulting from the use of an internal gear drive.

The reverse gear unit, consisting of a simplified clutch and reverse gear, is contained in a one-piece housing bolted to the rear of the flywheel housing and driven by a cushioned coupling plate bolted to the flywheel. The drive line is made up of the main driving shaft and propeller driving shaft for reduction gear models, while a flanged driving shaft is used for direct drive applications. Splined to the main driving shaft is a rotor type pump which furnishes oil for both hydraulic control and lubricating systems. Mounted aft of the oil pump is the carrier housing containing the clutch assembly and planetary gear set. Surrounding the outside of the carrier is the reverse band which is operated by a hydraulic piston, actuated by a simple lever. Conveniently mounted at the forward top

Packard Marine Reverse Gear

of the housing is the hydraulic valve for controlling the entire mechanism.

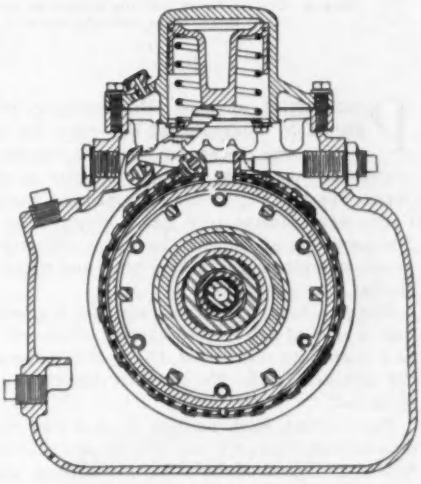
It is of interest that the reverse planetary gear set has bevel gears rather than spur gears, while reduction gears are of helical type.

Shockless operation, claimed as a unique feature of this unit, is attributed to the high degree of cushioning provided by a strong, spring-cushioned plate bolted to the rear face of the flywheel. It is splined to the reverse gear main driving shaft to transmit power; and also serves as a secondary vibration damper for absorbing initial torque in starting or shifting.

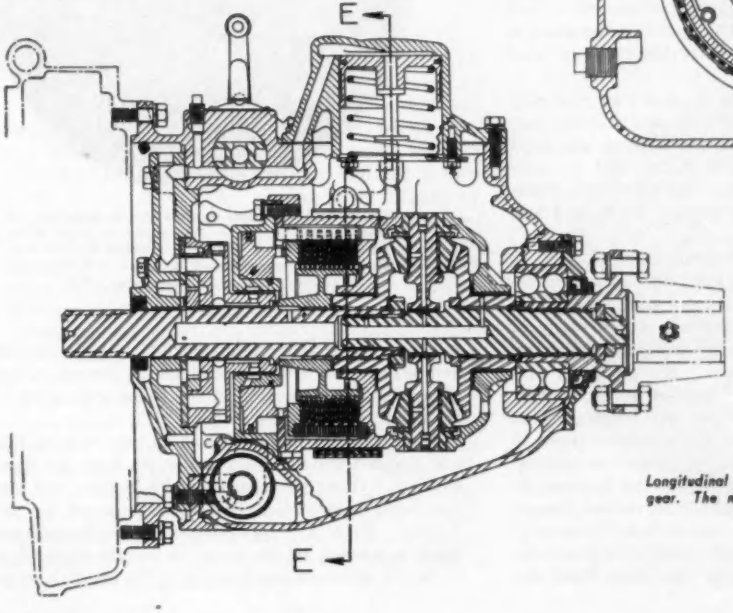
The installation is provided with an oil cooler to which is bypassed all circulating oil that is not required by the control or lubrication system. The cooler is a built-in unit, designed as a part of the engine, and accessibly located in the flywheel housing just ahead of the reverse gear.

From the standpoint of the boat operator, control of the unit is effected through a small lever. Finger tip pressure on this lever moves the control valve to effect any desired maneuver. Function of the rotary type hydraulic control valve is to direct oil through the proper passages for operating the clutch or reverse brake pistons. When the clutch is disengaged or the reverse band released, the control valve returns the oil from the clutch or brake cylinders to the reverse gear housing. As the engine is started, oil pressure is supplied to the control valve by the oil pump. While the valve is in neutral position it effectively seals off all control passages. When it is moved to forward position, a cross channel in the valve lines up the oil passage from the pump with another to the clutch-operating cylinder, the passage to the reverse brake

(*Turn to page 96, please*)



Cross sectional view showing details of the reverse band, reverse cylinder and piston, etc.



Longitudinal section of the Packard reverse gear. The model shown is direct drive.

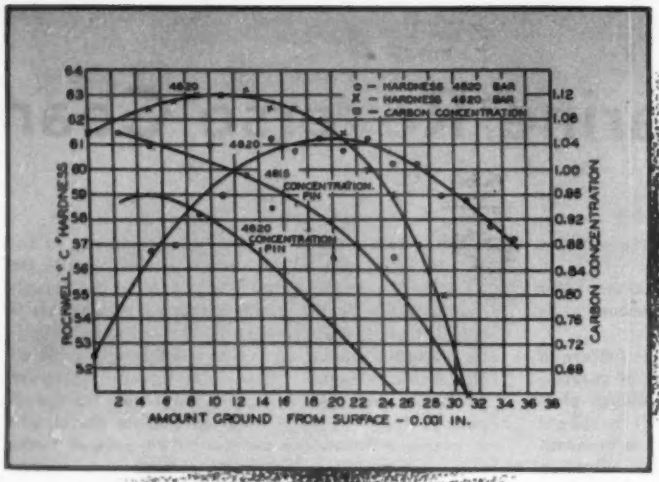


Fig. 1—A comparison of carbon concentration at Rockwell C hardness is shown for three materials—4620-H, 4820-H, and 4815-H. However, the Rockwell C curve for 4820-H also pertains to 4815-H and 4815-H carbon concentration curve also applies to 4820-H.

Mass

By W. C. Hiatt,
Asst. General Foreman, Heat Treat
and W. B. Cheney
Asst. Works Metallurgist,
International Harvester Co., Fort Wayne Works.

POSSIBILITIES of mass Marquenching were exploited by International Harvester Co. when $1 million was spent for the rearrangement and modernization of heat treating facilities at the Fort Wayne Works. Provisions were made on five Surface Combustion radiant tube gas carburizers to handle Marquenching of transmission gears, differential side gears, side pinion gears, king pins, and miscellaneous shafts.

Marquenching is a coined word for a process that uses a type of interrupted quench. Since oil is used as a quenching medium at 400 F, the temperature is not adjusted to the Ms point for the types of steel processed.

Development work on this process was conducted on a Quench-Master, a very flexible machine that permits close control of the quenching medium and many variables in agitation. It was found that we were able to quench gears within specified tolerances, eliminating the use of quenching presses, plugs, and special fixtures.

From our findings on individually handled parts in the Quench-Master, it was realized that mass quenching had possibilities if agitation and tank design could be improved. With this in view, a special study of tank design and agitation was conducted which resulted in our present technique. Marquenching produced gears with a minium of residual stress, thereby increasing their service life from 100 to 200 per cent and increasing the load-carrying capacity from 15 to 20 per cent as determined by dynamometer testing.

Many factors are responsible for the increase in gear life, such as furnace temperature, carbon concentration, speed of quench, and quench time; these properly controlled give the desired martensitic structure. Parts quenched by the process are made from the following types of material: 8620-H, 4620-H, 4815-H, and 4820-H. In order to produce the desired results, adjustments are required in the furnace temperature for quenching different steels.

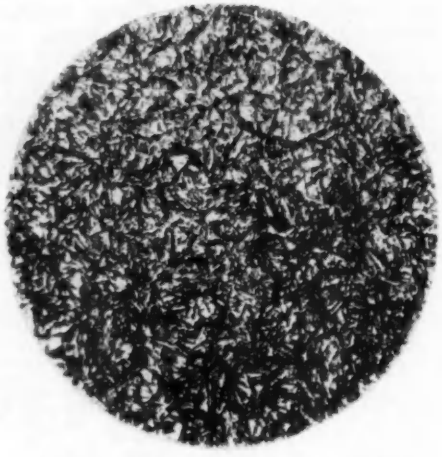


Fig. 2—Martensitic case structure of a Marquenched first speed countershaft gear — photomicrograph X500. While made from 4820-H material its actual analysis was: Carbon—0.21, manganese—0.76, nickel—3.45, chromium —0.08 silicon—0.23, molybdenum—0.25.

The first gears processed by this type of quenching and released for full scale production were for transmissions. Other parts such as side pinions and king pins have been studied, tested, and released for production. There are approximately 75 different parts being processed, which range in weight from ½ to 12 lb with solid sections from ½ to 2½ in. This varia-

Marquenching

International Harvester Is Producing Gears, Shafts, King Pins and Other Parts Capable of Greater Service Life Since Modernizing and Rearranging Heat Treating Facilities at Its Fort Wayne Works. In Addition To Increasing Quality of the Finished Products, Marquenching Has Reduced Distortion and Eliminated the Need For Quenching Presses, Plugs, and Similar Equipment

tion in weight, size, and design of parts presented numerous problems before proper quenching methods and an economical production flow could be established.

Parts discussed are processed in any one of five Surface Combustion radiant tube carburizers. These furnaces are two-row continuous type, containing 21 trays per row on which work is automatically carried into the furnace. Carburization temperature of each furnace is controlled by four Brown Electronic circular chart pyrometers to ± five F. The carburizing atmosphere used in these furnaces is RX gas as a carrier and 1050 Btu natural gas as an activator. A total mixture of 1300 cfh is introduced through a series of inlets located along the side and end of the furnace.

Excess carbon buildup in the furnace is removed by frequent burnouts, and also by suction cleaning at least every six months. This care increases the life of furnace alloy, insures clean work, and also better control of the carburizing action. The furnace is checked for carbon buildup every four hours by means of gas analysis and dew point. All of the gas analyses and dew points are posted on quality control charts so that furnace atmosphere can be constantly followed to maintain a uniform carbon concentration.

Furnaces are operated in cycle according to one of three specified case depths: 0.025-0.035 in., 0.031-0.047 in., or 0.047-0.063 in.

This close control results in the concentration of carbon which we consider optimum for hardness and structure. Believing that better load-carrying and wearing characteristics were obtained, it was our former practice to hold the carbon concentration in the range of 1.10 to 1.20 per cent on all types of carburized parts. However, an extensive study was conducted on hardness, wear, and structure, which proved that a lower concentration is desirable.

Fig. 1 shows a study of pins prepared for the comparison of carbon concentration and hardness. Seven cuts, 0.0015 in. on a side, were taken in order to plot the carbon concentration curves, while the hardened pins were wet ground in 0.002-in. steps to arrive at Rockwell C hardness. Three materials, 4620-H, 4820-H, and 4815-H, were studied. The Rockwell C curve for 4820-H also applies to 4815-H; and the 4815-H carbon concentration curve would be duplicated by 4820. It will be noted that the 4620-H pin reaches a maximum

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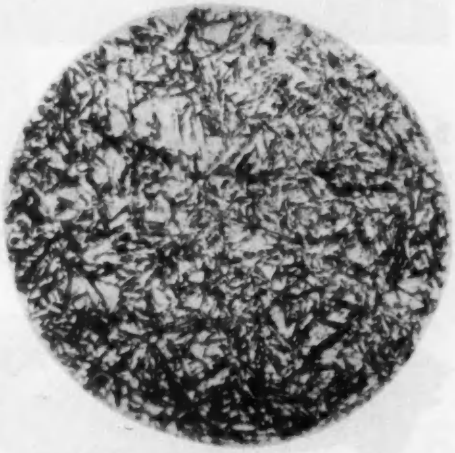


Fig. 3—Photomicrograph X500 of the case structure of a first speed countershaft gear that was quenched in the conventional manner.

Hot Rod

More than 82,000 automobile enthusiasts jammed the Third Annual Hot Rod and Motor Sports Show in Los Angeles recently to see the largest collection of automotive speedsters and specialized equipment ever assembled under one roof. The growing appeal of the unusual in automobiles was demonstrated by over-capacity crowds coming in such numbers as to cause the fire department to stop the sale of tickets several times throughout the four-day run of the show.

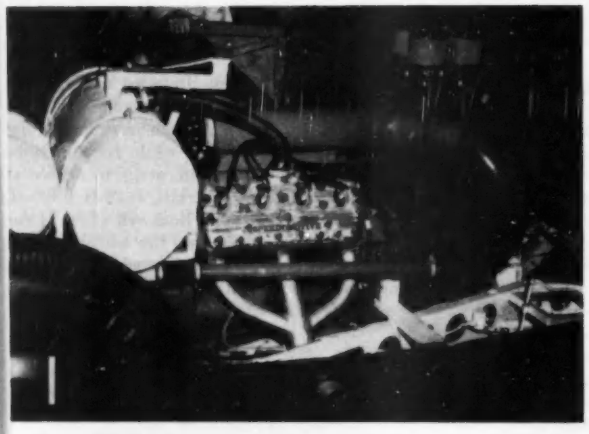
As well as hot rods, this year's exhibit included for the first time, custom built speedboats, motorcycles and domestic and foreign sports cars.

Sixty-four manufacturers exhibited new products, and took part in the special closed trade sessions during which they could transact business with invited guests. Seventy cars were on display.

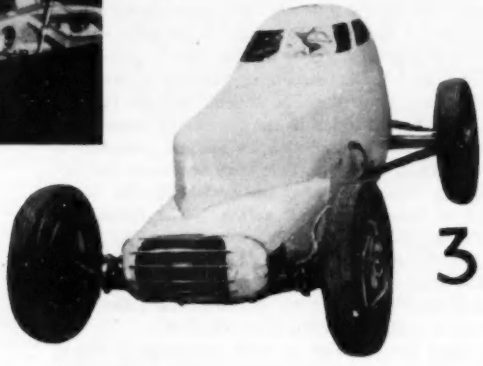
Fine interiors, superb leather upholstery, and unusual treatment of panels and instruments were evidence of the mature approach of the young builders whose cars were on display—and a revelation to those who had previously thought of a hot rod as a fenderless jalopy.

In body design and custom styling, cleanliness and functionalism were the dominant notes. Excessive chromium was absent. In road car styling, bright metal was used chiefly as a subdued accent. In the competition classes chrome went mostly on the running gear and under the hood.

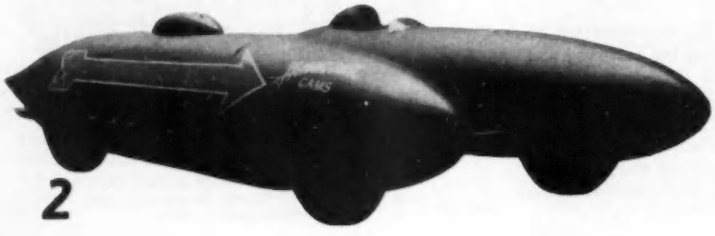
Visitors came from many parts of the country. Robert M. Barsky, managing director, told Automotive Industries that plans were under way for an expanded show in 1951 when exhibitors will be invited from all over the world.



1. *Developing 270 hp at 5300 rpm, 47 in. Hg manifold pressure, this Mercury engine converted by Bob Garratt of Puente, Calif., uses a Speedomotive positive displacement blower. The supercharger with four carburetors has a relief valve visible between the water tank and radiator hose. A speed of 152.54 mph is said to have been attained with this engine.*



3. *Completely enclosed and streamlined body on a Model T chassis uses a full race Mercury engine setup. The car has been clocked at 140.69 mph.*

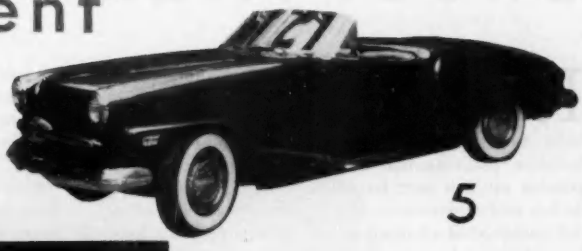


2. *Howard Johansen, Los Angeles, used airplane wing tanks for the bodies of this twin-fuselage streamliner which is based on an Italian design by Taruffi. A Mercury engine of 296 cu in. displacement developing 220 hp with Grancor equipment is located in one tank while the driver's cockpit is in the other. This unusual experiment, which is still being refined, has already been clocked at 171 mph.*

By R. Raymond Kay

Advancement

4



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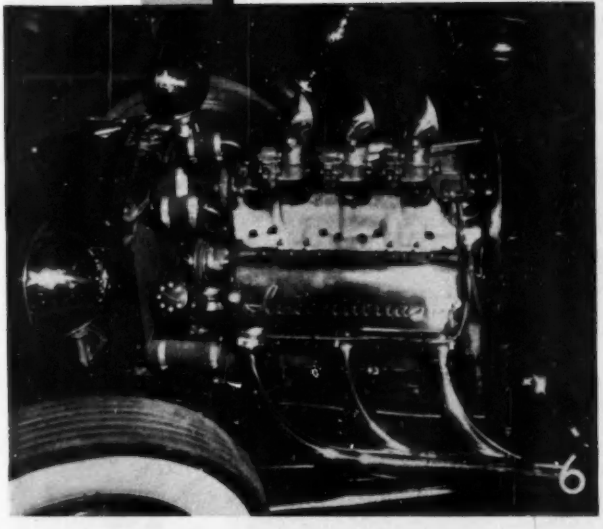

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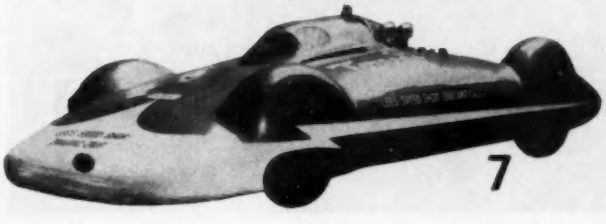


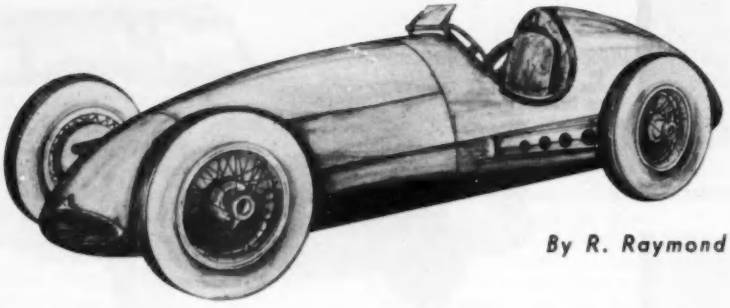
7

4. *Sterling Edwards sports car, engineered by Norman Timbs, built by Deidt and Lesovsky, was judged the outstanding car of the show for design and execution. Built for racing and road use, the car employs a frame of four in. steel tubing, independent suspension for all wheels with coil springs at the front and torsion bars at the rear, and an Eddie Meyers equipped Ford V-8 60 of 153 cu in. disp., which develops 120 hp at 6000 rpm. Wheelbase is 100 in. and the tread is 52 in. For racing, the windshield, hardtop, and bumpers can be removed.*

5. *Designed by Vince Gardner, South Bend, Ind., this car is an extension of original Studebaker lines. Angularity of the body is amplified since the hood and deck are flush with the fenders. Equipped with Weiand heads and manifold, the car won the "Press on Regardless" run held in Detroit.*

6. *A Ford V-8 engine mounted in a Model T chassis makes use of a three-carburetor manifold, double overhead valves, Scintilla magneto, and high lift camshaft.*

7. *Built for straightaway runs only, the Tornado Special has a 296 cu in. bored and stroked Mercury engine with three carburetors, double overhead valves, and special ignition.*



By R. Raymond Kay

Indianapolis Race Car Has

Sheet Aluminum Frame

RACING enthusiasts at the coming Indianapolis speed classic will see a new car owned by Ray Brady of Norristown, Pa. It was designed and built by Diedt-Schroeder, Inc., Los Angeles. The builders, realizing that light weight and proper suspension are two very important considerations in the design and construction of a modern Speedway racing car, constructed a chassis in which these features have been stressed to a much greater degree than in the past. Deviating from the standard practice of using either steel channels or steel tubing for the chassis frame and body superstructure, this design takes advantage of the light weight, high strength aluminum and magnesium alloys now available.

The chassis has been designed to make use of straight frame side members. Therefore, it has been possible to fabricate this unit from aluminum alloy sheet stock, using a box section of riveted construction. The outer rail is formed from 24 ST-4 (0.114 in. thick), and the inner rail from 61 ST-6 (0.091

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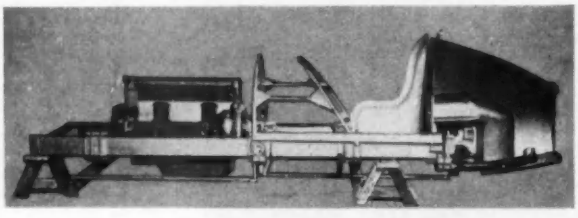
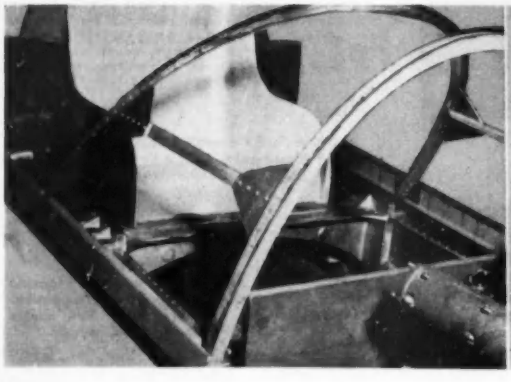
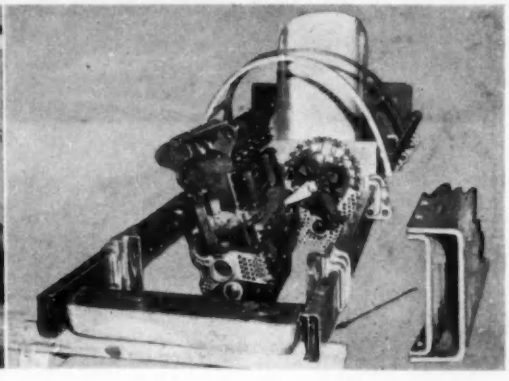


Side view of partially completed fuel tank and chassis layout.

Construction of the cowl frame and chassis frame cross member. The latter is a magnesium casting, machined to fit the box-section aluminum frame.

This view shows the box-section aluminum frame construction and magnesium mounting castings. The engine is inclined at 15 deg from vertical.





By R. Raymond Kay

Lou Moore's New Indianapolis Car

LOU MOORE, consistent winner in past years, is entering another Blue Crown Spark Plug Special, Junior, in the 34th annual Indianapolis Race May 30 in addition to the same three Blue Crowns run last year. The principal new feature of Moore's fourth entry is its ease of accessibility for servicing and maintenance. Body panels are so designed that they can be removed in a matter of seconds to permit work on the chassis, engine, instruments or transmission.

Body construction of the new rear drive Blue Crown Spark Plug Special, Junior, is all aluminum panels. The body design effects a weight saving of about 100 lb. Chassis frame construction is all steel. Approximate weight of the car is 1350 lb; overall length is 140 in. and the width is 60 in., about eight in. narrower than the original "Junior" entered last year.

The car is powered with a 270 cu in. non-supercharged Meyer and Drake four-cylinder engine, with modifications. Lee Wallard will drive in the race.

Pressure type aircraft carburetors—the first time in use at Indianapolis—are installed. Two Bendix Stromberg carburetors replace the conventional float type.

Another innovation is the use of magnesium disk wheels, which are about five lb lighter per wheel than

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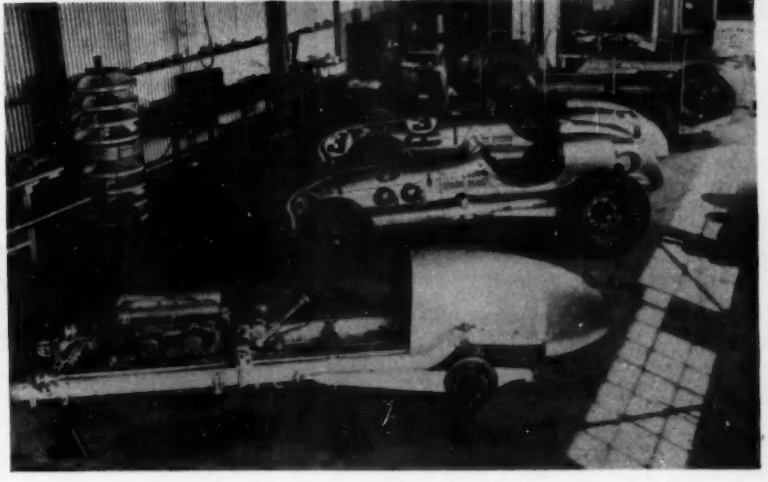


In the upper view is Lou Moore with his new 1950 Indianapolis entry. Note the two Stromberg aircraft carburetors on the 270 cu in., non-supercharged Meyer and Drake engine.

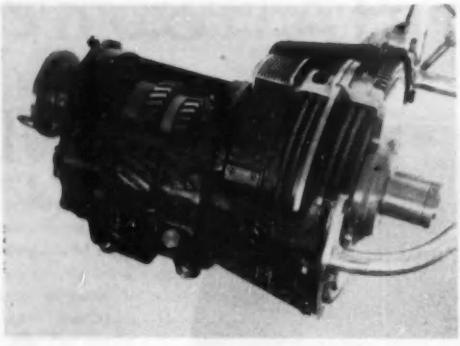
At the right are Lou Moore's four Blue Crown Spark Plug Specials scheduled to run in the 1950 Indianapolis race. The new rear drive chassis is shown in the foreground.

1950 Swiss

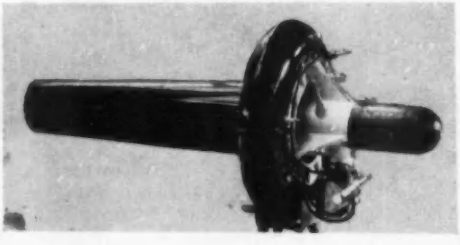
300 Exhibitors and 75 Makes of Passenger Cars

By W. F. Bradley

Special European Correspondent For Automotive Industries

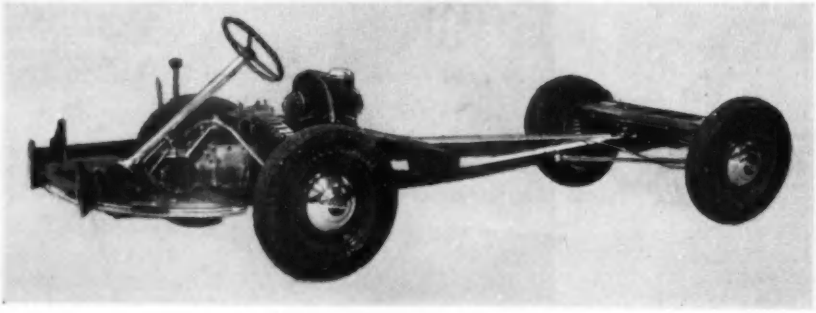


Cutaway view of the Kreis automatic transmission. This device employs centrifugal and overrunning clutches to change ratios automatically through its spiral gears. It has no hydraulic mechanism of any kind.



This small jet turbine weighs 92 lb and develops a thrust of 370 lb. It was exhibited by the Berger Co.

Chassis of the Tempo front-wheel drive truck which is powered by a four-cyl aircooled engine and has independent suspension for all four wheels. A transverse leaf spring is used at the front while coil type springs are employed for the swinging half axles at the rear.



Geneva, Switzerland

With area increased to 160,000 sq ft and a total of 300 exhibitors, the Twentieth Swiss Automobile Show, held in Geneva, was the most international, if not the biggest in Europe. The country has no passenger car industry and only a small truck production, with the result that all nations here are on an equal basis and Geneva is really Europe's automobile mart.

Of the 75 makes of passenger cars exhibited, the United States and Britain were numerically equal with 21 makes each, France had all its passenger car makers present and Italy was well represented. Although German passenger car makers were comparatively few, there was an important comeback among makers of the lighter variety of trucks adapted fo economic conditions in that country and also offered for export. The 45 truck and utility vehicle manufacturers were far from representing world production, the marine section was small, while the motorcycle and accessory sections were well filled.

Practically all the models had been seen previously at London, Paris and Brussels; only the Americans, who still lead in sales on the Swiss market by a slight majority, displayed 1950 models which had not been

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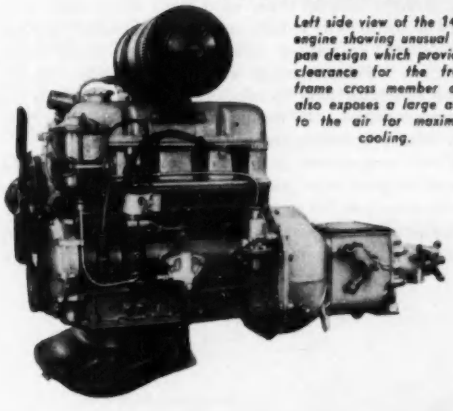
Automobile Salon

New Mechanical Features of Fiat's 1400 Model

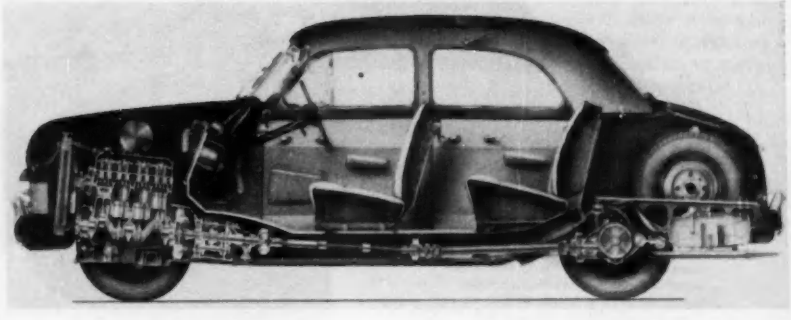
Four-door, six-passenger sedan.



Left side view of the 1400 engine showing unusual oil pan design which provides clearance for the front frame cross member and also exposes a large area to the air for maximum cooling.

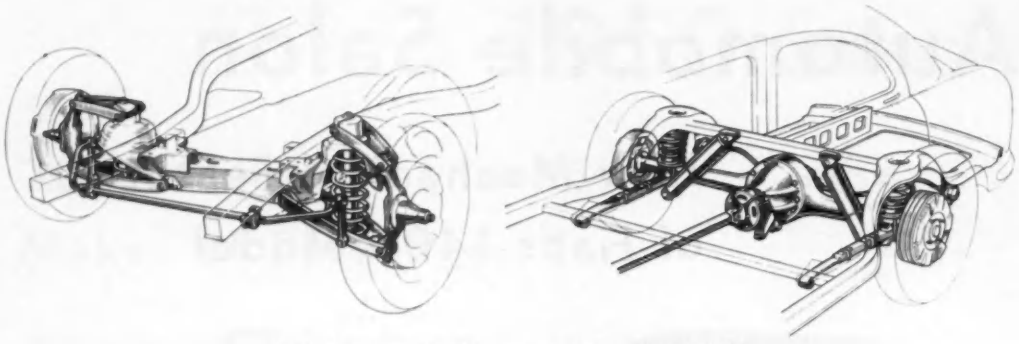
FIAT'S new car, the 1400, incorporates a number of design features not previously employed by Italy's largest automobile builder. Its rear suspension is a distinct departure with its leaf springs which act as torsion and radius rods, and coil springs to carry the vehicle's weight. The front suspension is of a conventional design with "A" shaped upper and lower support arms and coil springs. A new four-cylinder, 85.2 cu in. engine — approximately 1400 cc as indicated by the model number—features an extremely short stroke in relation to its bore. The bore is 3.22 in. and the stroke 2.59 in.

Compression ratio of the engine is 6.7 to one and its peak horsepower is 44 at 4400 to 4600 rpm. Valves are located in the light alloy head which is fitted with inserted valve seats. Cylinder liners are of the detachable wet type. A fabricated, sheet steel oil pan has its oil sump at the front end and is designed for maximum cooling. Light alloy is used for the clutch housing and a com-



This cutaway view shows arrangement of all principal units of the new car.

Fiat's New 1400 Model



Front and rear suspension systems no longer follow previous Fiat design.

bination of iron and aluminum for the transmission housing. Four forward speeds are provided with synchromesh on second, third, and fourth.

If the general lines of this automobile follow normal practice, there is a wealth of detailed ingenuity. The power plant is mounted at three points on a combination of springs and rubber, two of the points being near the center of gravity at the sides of the engine and the third at the rear of the transmission. Fiat engineers have succeeded in producing a very flexible take-up of the drive. In addition to the elastic mounting of the engine, the drive shaft to the hypoid rear axle, used by Fiat for the first time, is in two parts, the rear part having Spicer universal joints, and the forward portion being a square section torsion bar of about 0.6 in. diameter, mounted inside a cylindrical tube, with three rubber blocks between bar and tube. As the torsion bar is capable of twisting up to 40 deg under extreme conditions, its use very effectively damps out chatter in the transmission. To the rear of the transmission housing there is a large rubber coupling to further enhance the flexibility of the drive.

Another important innovation is a rear suspension which incorporates both coil and leaf type springs. Weight is carried by the vertically-mounted coil springs, supplemented by a transverse stabilizer. Direct-acting shock absorbers are inclined inward at the top approximately 45 deg. The leaf springs, which are quarter elliptic type, with their thick ends fastened to the axle by U-bolts in the conventional manner, are pivoted in rubber to brackets on a frame cross member. These springs do not carry any weight, their function being to take care of the drive and the torque reaction. Obviously, they are much more flexible than convention radius or torque arms.

Front suspension is more conventional, with the use of support arms and coil springs, the direct acting shock absorbers being located centrally in the springs. A transverse stabilizer is used. This front suspension displaces the Fiat version of the Dubonnet used for

(*Turn to page* 102, *please*)

Siata custom built body on 1400 Fiat chassis.

Aluminum Foil Proves Practical for Packaging

By Joseph Geschelin

Wrapping bench view at GMC showing simplicity of wrapping parts such as bearings, connecting rods, compressor crankshafts, etc., in aluminum foil.

EMBOSSED aluminum foil, in extremely light gages, has emerged as a practical method of packaging finely machined automotive parts at extremely low cost and with excellent protection against corrosion in transit as well as on the shelf. Aluminum foil as a wrap and as a liner for containers and heat-seal bags is currently being used in many plants throughout the automotive industries.

Stemming from the urgency of World War II military requirements, special techniques were developed for safeguarding metal parts against corrosion and the effects of condensation; and for protecting nonmetallic parts from rot and decay. Since most things were expendable during the war, economy had to give way to urgency and immediate results transcended cost.

Postwar practice, on the other hand, started with the techniques learned in the war years and progressed with an eye to simplified procedures which led to important savings in material cost and production economies. As a matter of fact, current activity promises not only greatly increased economy but measurable improvement in protection. Since eye-appeal and display are of importance in merchandising automotive parts, methods and materials have been evolved that greatly enhance these attributes.

One organization in the field of automotive packaging is the GMC Truck & Coach Div., General Motors Corp., where packaging has been placed on a footing with other major activities of the Division. Headed by a packaging engineer, adequate facilities were created for research and development that resulted in a standardization of meth-

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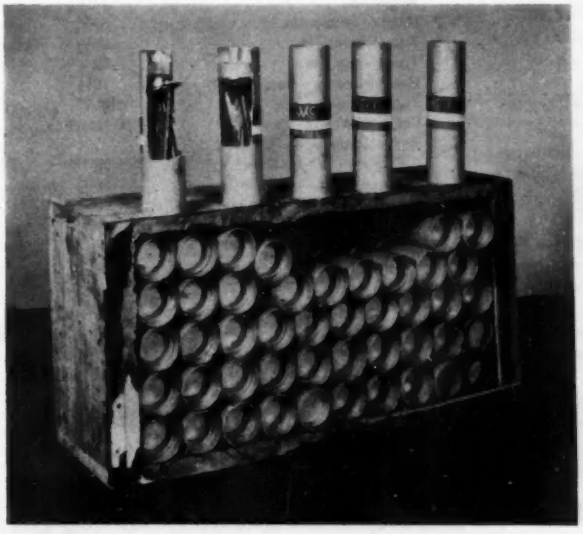
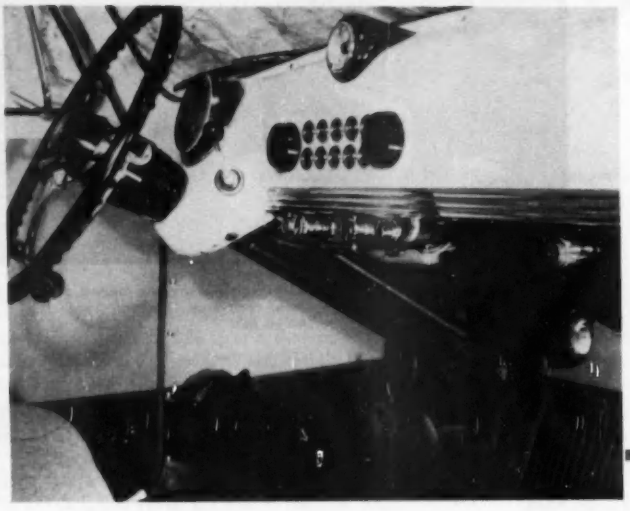


Versatility of the aluminum foil technique is exemplified in the packaging of engine valves in a laminated paper tube lined with foil. The closure, shown in the cut-away cartons, is made in different lengths, thus permitting use of a standard length container to house valves of different length.

New 2400-Lb. Nash Rambler



Gear shift and directional signal levers are mounted on the instrument panel which is located close to the driver. Note that the steering column mast jacket does not extend above the instrument panel.

By
Joseph
Geschelin

THE long awaited small car promised by Nash has been announced in the form of the Nash Rambler model mounted on a 100-in. wheelbase chassis. Priced under the Statesman line, the Rambler has comparable equipment and appointments with emphasis on quality and richness. As a matter of fact, the first model to be released for production is the Rambler Custom Convertible; the lower-priced Super models are to be announced later this year. The engine is basically the same as that used in the 1949 Nash "600" with some modifications.

Some unusual mechanical features are incorporated in the new line. For one thing the front suspension reveals design innovation of unusual distinctiveness. Although the suspension retains the usual upper and lower control arms, the coil spring, instead of being nested between the two lines, is mounted directly between the top of the steering knuckle support and a special mounting in the body structure. This permits the use of smaller diameter, longer coil springs having a lower spring rate and much greater deflection.

Similarly, the direct acting shock absorbers at the front end are mounted diagonally from the lower control arm to the body structure. The usual heavy front cross member is eliminated since the suspension system is connected directly to the body.

Another departure—for Nash—is the adoption of

Condensed Specifications
Nash Rambler Convertible

Wheelbase—in.	100
Overall length—in.	176
Width—in.	74½
Height—empty—in.	59¾
Tread—front—in.	53½
Tread—rear—in.	52
Road clearance—front—empty—in.	6½
Turning radius	18' 7"
Shipping Weight—lb	2400 (approx.)
Body—Dimensions—(Approx.):	
Elbow width—front seat	56
Elbow width—rear seat	52½
Shoulder width—front seat	52
Shoulder width—rear seat	47½

ENGINE SPECIFICATIONS

Bore (in.)	3⅛
Stroke (in.)	3¾
Displacement (cu in)	172.6
Torque (lb ft) max.	138 @ 1600 rpm
Brake horsepower	82 @ 3800 rpm
Compression ratio	7.25:1
Piston rings	4
Carburetor	1¼ in. Carter WA-1

Powered by 82-Hp Engine

Among Features of New Light Nash Is an Independent Front Suspension of Unusual Design. Semi-Elliptic Springs of Conventional Type Are Used at Rear. Appointments and Equipment Are Comparable with Those of the Nash Statesman Line. Rigidity Is provided in Convertible Body by Rails above Windows and Doors.

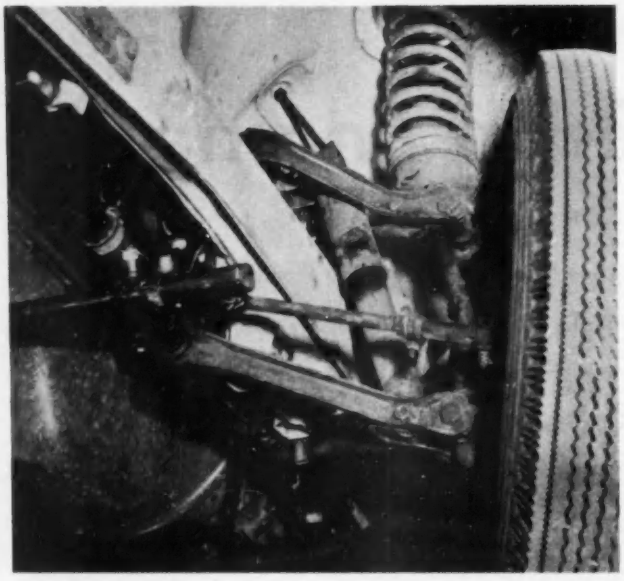
conventional semi-elliptic leaf springs at the rear and Hotchkiss drive. It will be remembered that the Statesman and Ambassador lines have torque tube drive and coil springs at the rear. On the Rambler the direct acting shock absorbers at the rear are mounted in what may be termed reverse sea-legs fashion, the upper mounting being wider spread than the lower. This was done to facilitate the housing of shock mountings within the corners of the luggage compartment.

An improved version of the Weather Eye, offered on this model, has a simplified blower, more efficient trap for storm water, and an accessible filter. Radio, directional signals, foam cushions, electric clock and Weather Eys are standard equipment at no extra cost on the Custom models of the new light car.

Like other models in the Nash line, the Rambler offers overdrive as optional equipment.

The convertible body for the Rambler is replete with unique design features. For one thing, since the entire line will be of Nash Unitized construction, special attention had to be given to structural strength and rigidity when the usual superstructure of a hardtop body was eliminated. To this end, the convertible is fitted with two compact rails along the top of side windows, joining the windshield header on each side to the lower body structure just in front of the side windows and forward of the trunk lid. The rails are chrome-trimmed and serve as a framing for the side windows.

Two compact side rails along the top of the side windows and doors of the convertible provide structural strength and rigidity without excess weight.



Front suspension of the Nash Rambler. The lower arm is relieved of all but wheel alignment loads, permitting lighter construction and reducing unsprung weight.

Four intermediate bows, guided by the structural rails, support the fabric top. The top is of sliding type, the topheader being attached to nylon-covered cables which are actuated from an electrically driven drum behind the rear seat. The usual pantograph type folding linkage is conspicuous by its absence in this design. Latching of this top is interesting. The top header is provided with spring loaded plate hooks at each end which automatically engage with pins in the top rails. The hooks provide the tension necessary to keep the top taut and smooth. Toggle type latches are used to lock the top securely to the windshield header.

Seats are designed to accommodate three in front and two in the rear. The front seat is divided off-center for maximum comfort to passengers.

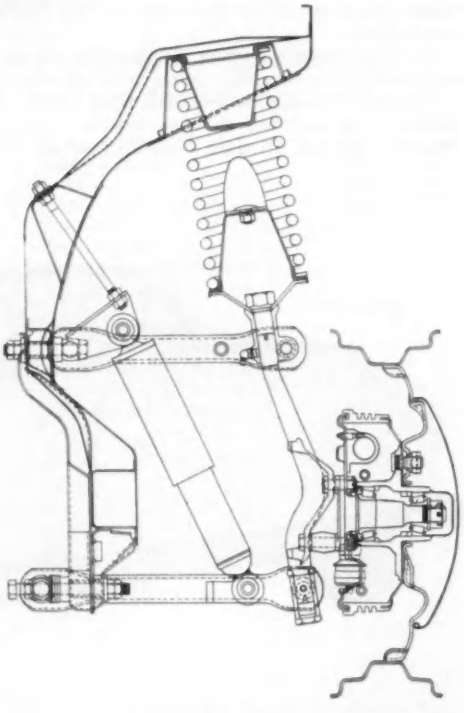
Because of the compact interior arrangement, the instrument panel is quite close to the driver, making it possible to mount the steering wheel so no column is exposed. Similarly, the gear shift and directional signal levers are mounted right on the instrument panel. To the right of the driver the panel sweeps forward to afford knee-room for the passengers.

Parking brake control is floor-mounted at the left hand "squab" panel. Clutch pedal starting is retained.

The Rambler has a one-piece curved windshield. The rear window of the convertible is flexible and has provision for "zipping" out for extra ventilation with top up.

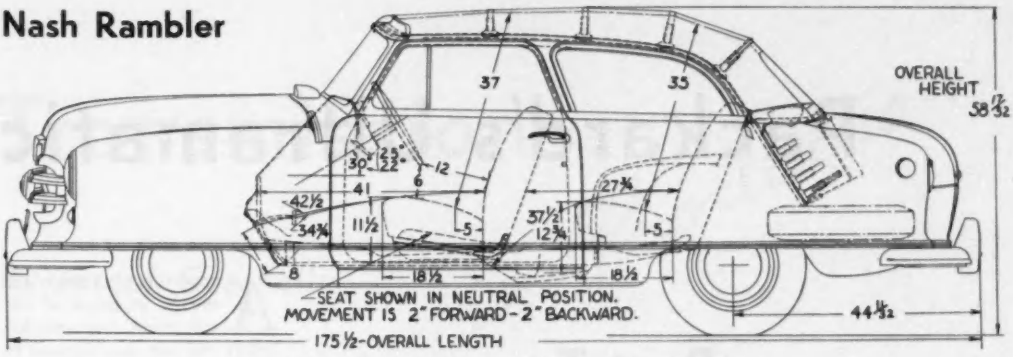
Returning to mechanical details, consider that the front suspension has a coil spring installed between the top of the steering knuckle and a high point of the front body structure, just inside and above the front wheel. In this location the front springs take nearly direct wheel loads, the front suspension linkage being required to take only side thrust and maintain wheel alignment. Lower control arms, in particular, are no longer subjected to vertical and bending loads and are made considerably lighter. Another advantage claimed is that control arms need not be insulated from the body since they no longer transmit vertical loads.

With the elimination of the usual heavy front cross-member, the front of the engine is supported on a new cross-member of relatively light construction. The front end structure also marks the elimination of the extra body extension members—used on Statesman and Ambassador bodies



This sectional illustration shows details of the new suspension and how the coil spring is supported.

Nash Rambler



Drawing showing principal measurements of the Nash Rambler body.

—since the front bumper is mounted directly to the body sills.

Steering linkage is of inverted type with the pitman arm on top in accordance with the desired steering geometry and positioning of the steering wheel. Steering stop screws are on the pitman arm, contacting bosses formed on the steering gear housing. Tie rods are forward of the front wheel center line.

Hotchkiss drive on this model employs six-leaf semi-elliptic rear springs with non-metallic inserts between the four longer spring leaves to control friction. Three inserts are used on each end, making 12 inserts per spring. Rubber insulated connections are used at the front end of rear springs, rubber-bushed shackles at rear ends.

Clutch linkage is similar to that on the other models, although differing in appearance and location. A lever, pivoted at the center, is located behind the clutch pedal. Short links connected the ends of the lever with the clutch pedal and with the clutch actuating lever.

The engine, as mentioned earlier, is basically the same as the 1949 "600" but with higher compression ratio and tuning for increased fuel economy. It is fitted with the new squeak-free wedge type narrow fan

(*Turn to page* 100, *please*)

Our Proved Reserves of Oil and Gas at All-Time High

PROVED reserves of crude oil and natural gas in the United States again increased in 1949, reaching new all-time peaks, according to the American Petroleum Institute and the American Gas Association in a recent joint report on the results of the near-record breaking rate of petroleum exploration in the 12-month period ending Dec. 31, 1949.

Proved reserves of crude oil and natural gas liquids —condensates, natural gasoline and liquefied petroleum gases—were estimated at 28.3 billion barrels at the close of 1949, an increase of 1.5 billion barrels over the preceding year's total of 26.8 billion barrels.

It was estimated that proved reserves of natural gas amounted to 180 trillion cu ft. This is an increase of 6.5 trillion cu ft over 1948's year-end total of 173.8 trillion cu ft.

Proved reserves are the underground supplies which the oil and gas industry can draw upon for consumption at any time. They are the reserves whose location and extent have been proved and measured by drilling. It is important to note, however, that estimates of these reserves cannot be used in measuring the rate at which they can be produced with or without physical waste. Oil cannot be produced from the permeable rocks in which it occurs at

(*Turn to page* 100, *please*)

Reserves and Production of Crude Oil, Natural Gas, and Natural Gas Liquids in U. S.

Reserves	Dec. 31, 1948	Dec. 31, 1949 (Barrels of 42 Gal)	Increase 1949 Over 1948
Crude Oil	23,280,444,000	24,649,489,000	1,369,045,000
Natural Gas Liquids	3,540,783,000	3,729,012,000	188,229,000
Total Liquid Hydrocarbons	26,821,227,000	28,478,501,000	1,657,274,000
		(Thousands of Cu Ft)	
Natural Gas	173,869,340,000	180,381,344,000	6,512,004,000
Production	1948	1949	Increase 1949 Over 1948
Crude Oil	2,002,448,000	1,818,800,000	(—)183,648,000
Natural Gas Liquids	163,749,000	198,547,000	14,798,000
Total Liquid Hydrocarbons	2,166,197,000	2,017,347,000	(—)168,850,000
		(Thousands of Cu Ft)	
Natural Gas	6,007,928,000	6,245,941,000	237,413,000

The gas production figures indicated above are net after deducting only the amount of gas returned to reservoirs for cycling and pressure maintenance. They therefore include the gas put into underground storage.

Packard's Ultramatic

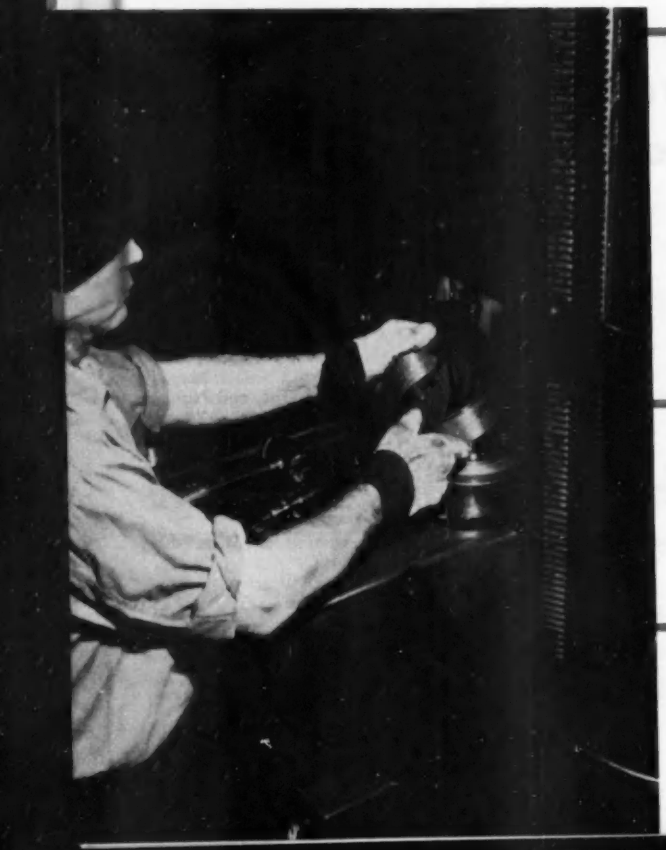
Part Two

The use of composite assemblies and employment of special techniques have enabled Packard to reduce production costs of the Ultramatic transmission as compared to more conventional methods. Pearlitic malleable iron castings are used for parts which would normally be made from steel forgings. Silver brazing of composite assemblies saves both machining and material costs. These and other procedures are described in this article—the second of three. Part III, which will be devoted to plant layout and transmission assembly methods, will appear in an early issue of AUTOMOTIVE INDUSTRIES.

AN opportunity to study the design elements of the ultramatic transmission before the unit was released to production made it possible for the metallurgical department at Packard to recommend certain changes in design to accommodate composite materials and to utilize special techniques. The net result of this program was a marked simplification of process with a consequent reduction in manufacturing cost as contrasted with a more conventional approach. A number of parts selected for special attention in this article will illustrate the point.

It may be mentioned at the outset that Packard has made generous use of pearlitic malleable iron castings in applications where steel forgings might be used normally. This is true of the front and rear halves of the planetary cages, the transmission clutch housing, and planetary ring gear. The converter clutch housing, on the other hand, is of plain malleable iron while the two large castings—the transmission case and bell housing are made of gray iron.

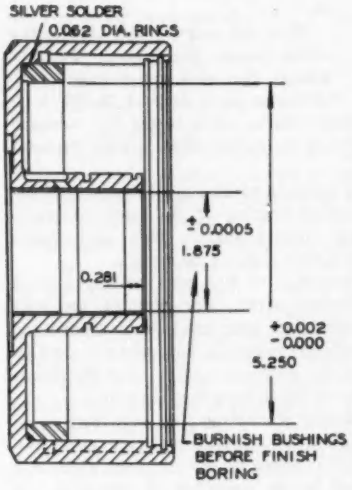
Interesting feature of the planetary ring gear is that it is used without heat treatment, Brinell hardness "as cast" ranging



One of the major operations in the fabrication of the Ultramatic brake band is the formation of five lugs from the previously machined steel ring. The operation is performed, as shown, in an Oilgear type XS, 15-ton surface broaching machine.

Transmission in Production

By Joseph Geschelin



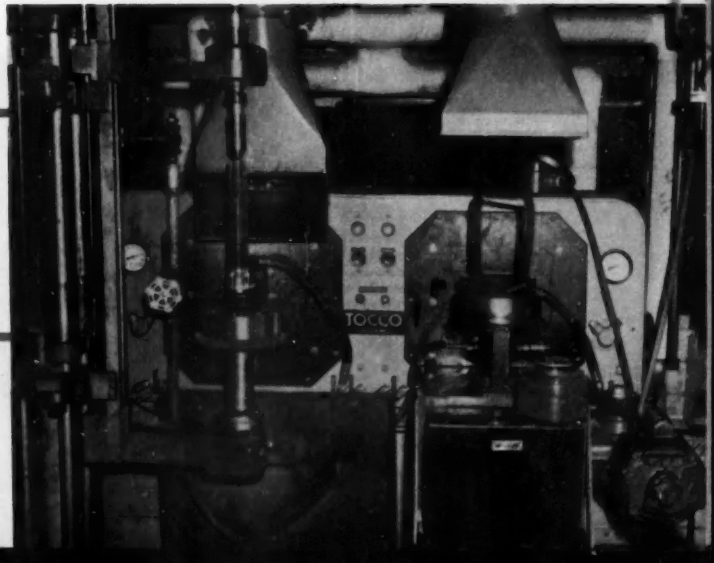
An example of silver brazing of dissimilar materials is found in the case of the transmission clutch housing. The body of the part is of pearlitic malleable to which is silver-brazed a steel ring in a manner described in the text.

from 197-241. Although internal gear teeth thus are used without additional hardening they have been found to give prolonged service with satisfactory results.

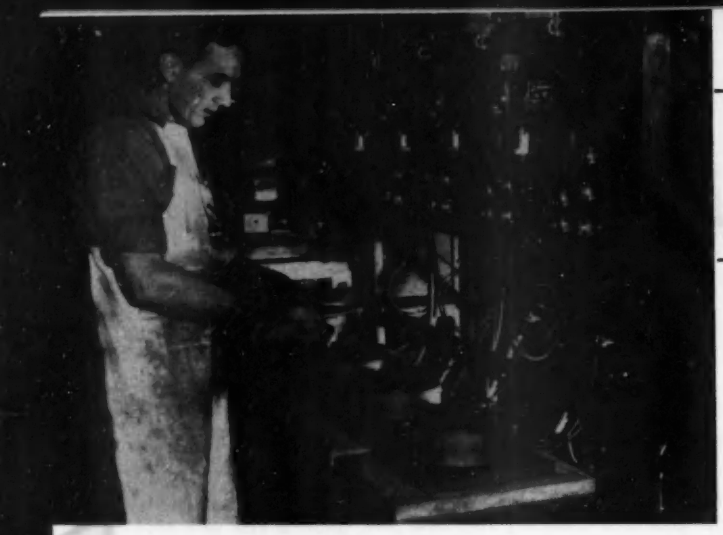
Silver brazing by induction heating is employed successfully in the fabrication of parts using combinations of different materials. An excellent example is found in the case of the transmission clutch housing. Here the part is made of pearlitic malleable iron to which is silver-brazed a steel ring. The construction is shown in the cross-sectional drawing of this part, the steel ring being fitted within the lower end of the bore. The advantage of this is that it permits precision machining of the inner surface, including the cutting of longitudinal slots without interference. It also provides a finely finished steel surface at the ring.

Silver brazing is done at one station of a new Tocco induction heating machine, operating with a frequency of 9600 cycles. A single preformed ring of silver solder is required for this operation, the ring being placed in a machined groove at the lower edge of the steel bushing. Because of the mass of metal that must be heated to brazing temperature the time cycle for the operation is 75 seconds.

One of the interesting machining operations on this part is the simultaneous grinding of the ID of the steel ring and OD of the hub—to pilot the clutch piston—in a single setting in a Parker-Majestic grinder fitted with two high speed internal grinding



This is a view of the two-station Tocco induction heating machine used for silver brazing. The station at the left takes the planetary cage and output shaft assembly while the one at the right handles the brazing of the steel ring to the clutch housing.



For curing the cement bond between the brake band and lining, the parts are loaded on expanding mandrels in the machine pictured in this view.

spindles. Since the centers of the wheel spindles can be adjusted and held to precise limits, it is possible to maintain extremely fine tolerances on both diameters.

Perhaps the most impressive of the silver brazing operations is found in the joining of the planetary cage half and the output shaft. In conventional practice the shaft and flanged end might be produced in the form of a single forging. At Packard the part consists of the assembly of the shaft end, made from SAE 1151 steel, and the planetary cage section, made of pearlitic malleable iron. After both parts have been machined they are joined by silver brazing on the second station of the Tocco machine mentioned above.

Several problems required solution in making a good brazed joint in production. Obviously, chemical cleanness of both parts is essential and steps have been taken to assure this requirement. In making the joint, the shaft has an accurately ground pilot which fits into the hub bore. Because of the large mass of metal at the hub and shaft which must be heated to brazing temperature—requiring a cycle in the Tocco machine of 110 seconds—it was found initially that the hub at the lower end tended to contract. This had the effect of cramping the shaft and throwing it out of line. This was solved by grinding the pilot end to a taper and when the proper amount of annular clearance as well as taper had been determined the brazed joint came out perfectly and with a close fit.

Since the output shaft carries the entire torque for driving the rear wheels, the joint was specified with ability to carry at least 12,000 lb in. Actually production shafts, when tested for torsional strength, will fail in the parent metal before the joint can be broken.

Silver brazing has been applied to a third part of the assembly—permanent brazing of the selector lever to the transmission control shaft. This part, being smaller, requires a time cycle of 26 seconds.

Induction hardening too has been employed on a number of important parts. For example, the gear teeth of the parking lock gear are induction hardened selectively. Similarly, induction hardening is used on the gear teeth of the governor pinion. Too the thrust end of the reactor shaft is induction hardened.

Selective hardening of starting ring gear teeth posed a problem at the start. Conventional ring gears can be readily treated by flame hardening since distortion is later corrected in the operation of shrinking the ring onto the flywheel. But in the Ultramatic the ring gear is fitted on and welded to a relatively light steel stamping where local distortion simply could not be tolerated.

Another example of an ingenious combination of dissimilar materials to form a major part is that of the planetary cage-half and the output shaft. The cage is a pearlitic malleable casting. The two machined parts just prior to silver brazing are shown here.

Here the solution was found in the adoption of the well-known Cincinnati Flamatic machine which controls surface temperature within extremely close limits and can perform this fussy operation without distortion. As a matter of fact the part is taken directly from the Flamatic without subsequent drawing. The job is done at the rate of 120 pieces an hour.

Unquestionably one of the most interesting fabricating jobs in the Ultramatic is the production of the brake band assembly. Incidentally, the Packard method marks a departure from conventional practice used heretofore.

Packard's Ultramatic Transmission

In the first place Packard elected to make the band and lug separately and decided further to fabricate the lug from tubular machined stock rather than from forgings. Both the band and the lugs start in the form of SAE 5140 steel tubing, this material being specified because of the high unit loading carried by the band. It is estimated that under reverse loading the band has a unit stress of 50,000 psi.

Lugs start in the form of thick-walled tubing which is bored, turned, and cut-off in a Potter & Johnston 5-D automatic turret lathe. These tubular sections are then presented to an Oilgear Type XS 15-ton, single ram surface broaching machine having an indexing table, to rough out the formation of five separate lugs to each piece. Each lug is drilled, then the lugs are cut apart in a Kent-Owens horizontal mill, five lugs to each piece.

The lugs then are degreased and copper plated all over in a tank unit. This plating serves for the subsequent brazing to the brake band.

Meanwhile, the tubing for the brake band is faced and rough- and finish-formed on the OD and ID in a big seven-in., four-spindle Conomatic. Then it is degreased and chemically cleaned.

This is followed by the assembly of the lug to the band, the lug being held in place by two Phillips head screws in the center for the purpose of holding securely during the brazing operation. Since brazing requires intimate contact of the lug with the OD of the band, the fit is checked to assure a gap not exceeding 0.002 in. at the ends. Brazing is the next operation and this is done at a temperature of 2050 F in a new Westinghouse hydrogen brazing furnace, using the Westinghouse Endo - Gas generator. The latter features special silicon-carbide refractory retorts which promote a controlled atmosphere free from carbon-dioxide and unusually high in hydrogen—35 per cent.

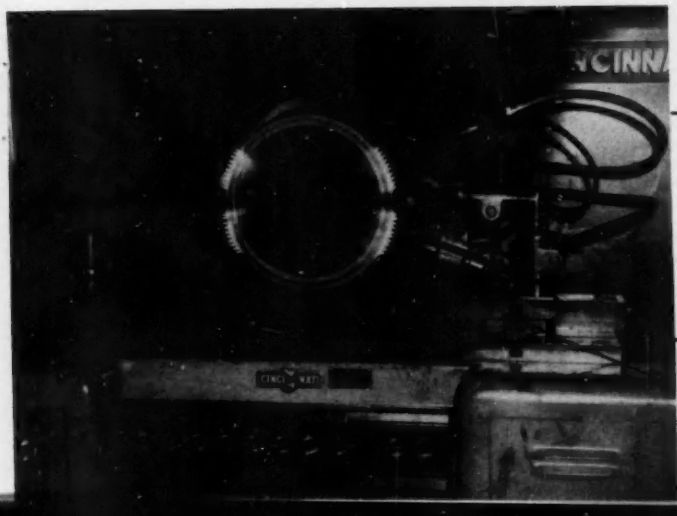
Because of the high unit loading of the band decarburization can not be tolerated and this new furnace not only prevents decarburization but actually permits some carbon pick-up. Following brazing the band and lug assembly is die quenched in a Gleason machine to preserve the contour and prevent distortion.

In subsequent machining of the band and lug assembly the principal steps are the finish-formation of the lug in another set-up in an OilGear broach, and internal grinding in a series of chuckings in Bryant internal grinders.

Final steps in completing the brake band assembly then follow. The first major step in this sequence is the grit-blasting of the inner surface of the band to provide a good surface for bonding the lining. However, the process also has the aspect of shot peening and serves to place the surface in compression so as to impart spring quality to the band after the joint is sawed apart. This grit blasting operation is done in a new six-ft Type LG Pangborn table type machine.

Meanwhile the friction lining, supplied by Raybestos-Manhattan, is prepared for bonding to the grit-blasted band. For this purpose, Cycle-Bond cement is sprayed on one side in a wet film thickness of 0.008 to 0.010 in., and pre-dried to evaporate the solvent. The lining is then rolled to

(*Turn to page* 112, *please*)



Selective hardening of starter gear teeth is done in this special Cincinnati Flamatic machine at a rate of 120 pieces an hour. The control of surface temperature in this machine is so precise as to do the job without distortion. The work is taken directly from the Flamatic without subsequent drawing.

AIRBRIEFS

—By ROBERT McLARREN

B-36 Continued

For many years the Air Force has publicly dubbed the Boeing XB-52 as its B-36 replacement and made continuous reference to the huge new Boeing as its future strategic bomber. Now it develops that the Air Force has abandoned the B-52 for future procurement and chosen as the B-36 replacement none other than the B-36 itself! USAF now is going forward with plans to add swept-back outer wing panels, supersonic propellers and turboprop engines to the B-36 in a program it believes will bring the B-36 up to a performance of 500 mph at 55,000 ft. Engineers generally agree to the magnitude of the B-52 design problem—a turbojet-powered aircraft with a range of 10,000 miles. None doubt that such a problem is formidable but there are several approaches to the task making such a job practical. The Air Force will continue the XB-52 project through the completion and flight testing of two prototypes but does not plan future production. Reason generally given is the cost problem, with the B-36 bombers, currently in production, costing $4,700,000 each, whereas the XB-52 is estimated to cost $7,500,000 each in limited production. It would appear that we are going to continue to hear about the B-36, pro and con, for many years to come.

Martin Comeback

Announcement of the purchase of 65 Martin 4-0-4 transports by Trans World and Eastern Airlines may be only the beginning of a powerful resurgence of the Glenn L. Martin Co. Eastern is said to have an option to purchase 15 additional airplanes beyond the 35 it has contracted for, and TWA a substantial number above its obligated 30. If these options are exercised, the total order for the new 4-0-4 may reach 100, an astonishing number of half-million dollar transports in these times.

Although many observers believe that Martin will take a loss on its 4-0-4 project, the prestige value of proving the design sound and profit-making for its purchasers is certainly worth the risk. The new model features an entirely new wing structure, pressure cabin and four additional seats in a longer fuselage, all requiring extensive redesign and increasing manufacturing costs. But TWA has agreed to lease 12 Martin 2-0-2's, uncompleted at the plant in earlier production, and an extensive service-test period for these airplanes will make them desirable either for TWA or some other purchaser. Martin's flying boat business, for which it has been long famed, is currently an order for five P5M-1 models for the Navy with a huge version, turboprop-powered, undergoing design.

Atomic Aircraft

Few subjects have been more "hush-hush" in the past five years than the project to develop a nuclear energy powerplant for aircraft. It all began as an Air Force NEPA project, with the Air Force designating Fairchild as manager of operations. Fairchild enlisted the aid of major aircraft and engine manufacturers, a small office was set up at Oak Ridge, each contractor furnished a hand-full of scientists and the project got under way. But with the bomb, radioactive materials manufacture for medicine, etc., and other research, NEPA found itself shoved farther and farther into the background, with the Atomic Energy Commission giving it a low priority that prevented its obtaining the personnel and equipment it needed. The situation became so bad that in 1948 the AEC contracted with M.I.T. to conduct a special study of the practicalities of the problem and make recommendations. The M.I.T. study produced the "Lexington Report," details of which are secret. But, in general, the report recommended a higher priority for the project, a decentralization of its direction, and another study in two or three years to again appraise progress. Dr. Lawrence Hafstad isolated the problem as one of designing a reasonably light-weight reactor and suitable shielding for the crew, both of which he indicated may very well be impossible and certainly not practical soon. But Andrew Kalatinsky, Fairchild chief engineer of the project, recently told the I.A.S. Propulsion meeting in Cleveland that a flight test date had been set for an atomic-powered prototype airplane, throwing a bombshell into the subject. He did not, of course, mention the date.

Following the recommendations of the Lexington Report, the project is no longer exclusively the Air Force under Fairchild management but is now a joint project of the Air Force, the National Advisory Committee for Aeronautics, the Navy Bureau of Aeronautics and the Atomic Energy Commission. Original NEPA subcontractors, including United Aircraft, Wright Aeronautical, Continental Motors, Allison Division of General Motors, Lycoming Division of Aviation Corp., Frederick Flader, Northrop Aircraft, Menasco, Westinghouse and M.I.T., continue in the new organization.

Passenger Helicopter Service

While the Civil Aeronautics Board ponders the records of testimony delivered in its "New York Helicopter Case," in which a dozen groups seek permission to begin the world's first passenger helicopter service on regular schedule, our friends the British are stealing a march. On June 1 British European Airways will inaugurate scheduled passenger helicopter service between Cardiff, Wales, and Liverpool, England. And the worst blow of all is that the service will use Sikorsky S-51 helicopters! BEA has been experimenting with helicopters for more than two years and plans the new service as a proving run for more extensive development later on. Meanwhile, the New York area applicants plus the major U. S. helicopter manufacturers are standing by, their hopes of pioneering the world's first scheduled passenger helicopter service now gone glimmering.

Turboprop Deluge

As predicted here months ago, announcement of the first U. S. turboprop aircraft has been followed immediately by a veritable deluge of the type with almost all transport aircraft manufacturers revealing plans in various stages of fruition. Boeing Airplane Co. has released an "artist conception" of a turboprop-powered version of the huge Stratocruiser. Engines specified are four Allison T-40 units of 5500 hp each. Significantly, the version released is that of the C-97A military Stratofreighter and shows a pair of the huge 700-gal external fuel tanks developed for the B-50D bomber. Boeing engineers calculate that the switch from 3500 hp P & W R-4360 Wasp Major engines to the Allison units would provide a saving of 25 per cent in power plant weight, which could be used for 1000 gal of added fuel or a 6000 lb increase in useful load. Douglas has completed preliminary studies of a turboprop version of the successful DC-6

(*Turn to page 94, please*)

24-Volt Equipment for Army Vehicles

Operates in Water

TWENTY-FOUR volt electrical equipment for Army tactical vehicles to operate as efficiently under water as under normal driving conditions has been developed by the Electric Auto-Lite Co. This equipment includes starter, generator, regulator, distributor and coil. All have passed rigorous tests under supervision of the Ordnance Department and have been accepted by the Department of the Army as original equipment on tactical vehicles.

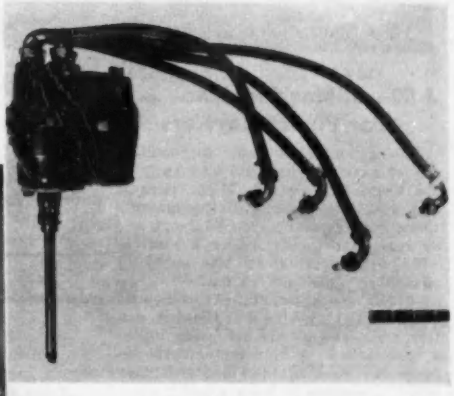
This equipment is designed to withstand the corrosive attack of frequent salt water immersion and to operate in extremes of temperature ranging from —70 F to 160 F. Many new developments enable the units to withstand these conditions and operate continuously for 1000 hours without maintenance. In spite of the stringent requirements, unit designs have been kept readily serviceable in the field if necessary. The 24-volt units meet the requirements of the newly standardized Army electrical and radio equipment.

The new equipment is said to represent a tremendous advance over so-called waterproof equipment used in World War II, which suffered both in performance and in service life when submerged in water. It will be incorporated on Willys-Overland Jeeps and also on trucks manufactured for the Army by the Chrysler Corp. It is equally applicable to other tactical equipment.

Two engineering accomplishments were achieved in developing this equipment. One was the creation of an efficient 24-volt ignition coil which is smaller than a six-volt coil, and the other was the successful sealing of the shaft extension and permanent lubrication of the generator shaft bearings and seal.

The generator shaft seal is of the precision, high-speed type utilizing an exterior, stationary sealing ring and a revolving, interior mating ring. The sealing ring has a carbon face, the mating ring a hard-

(*Turn to page 60, please*)

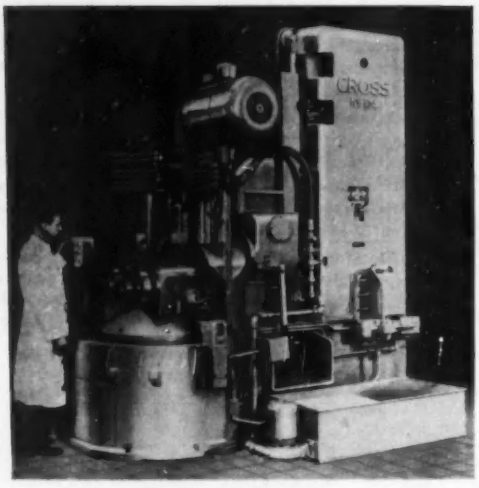


Above:
Combining the distributor and coil in one unit simplifies waterproofing.

Left:
Arrangement of electrical equipment on a Jeep. The distributor-coil combination is shown at left center, the starting motor below it, and the generator to the right of the starting motor. The voltage regulator is shown below the generator and starter.

• PRODUCTION • NEW EQUIPMENT • PLANT •

FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 58



Cross special machine tool for milling planet carriers

Cleveland straight sided double crank double action toggle press, Model 2T-96-400

J-50—Milling Machine For Planet Carriers

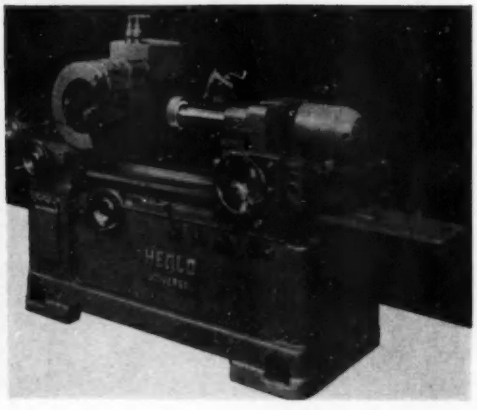
Special machine tool for milling planet carriers, designed and built by the Cross Co., Detroit, Mich., permits one unskilled operator to plunge mill three gear clearances on 85 front and 85 rear planet carriers, or a total of 170 parts per hr at 100 per cent efficiency. This rate is made possible by use of a two station index table with two pieces being loaded at the first station while two others are being milled at the second. A fluid motor drive indexes the work spindles and the index table. Clamping is by a gravity operated cam. Cutter spindles are worm gear driven. A 450-lb fly wheel is attached to each spindle. Cutting speed of 425 sfm is possible. Other provisions include hydraulic feed, rapid traverse, and use of standard cross sub-assemblies to facilitate maintenance, reduce down time and provide flexibility for reasonable part design changes.

J-51—Double Action Toggle Press

Straight sided double crank double action toggle press, Model 2T-96-400, put out by The Cleveland Punch & Shear Works Co., Cleveland, Ohio. Press is double geared, twin drive, equipped with single station electrically controlled air operated drum type friction clutch with spring loaded brake. The flywheel is arranged with an auxiliary air brake and both the slide and the blankholder are air counterbalanced. The inner slide has a stroke of 33 in. and the blankholder slide a stroke of 22 in., with 8 in. adjustment provided for both. Bed area of the press is 60 in. by 96 in. and the capacity rating is 400 tons for inner slide and 250 tons for outer or blankholder slide.

J-52—Universal Internal Grinding Machine

Universal internal grinding machine is designed by Heald Machine Co., Worcester, Mass., for variety of tool room work and is equally applicable to longer production operations. Workhead swivels to 90 deg. and is hydraulically driven, permitting infinite speeds within range of 40 to 350 rpm. The machine grinds straight or taper holes, straight or taper OD's, and flat or convex surfaces.



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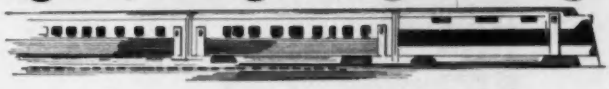
makes your product lighter, stronger, longer lasting



REDUCE WEIGHT

Because its high strength-to-weight ratio permits use of lighter sections, HI-STEEL makes possible important reductions in dead-weight. Less steel is needed per unit, enabling material savings up to 25%.

INCREASE STRENGTH

High strength, low alloy HI-STEEL has nearly twice the yield strength of ordinary structural-grade carbon steel. It is also superior in notch toughness, fatigue strength and abrasion resistance. Because of its high strength-to-weight ratio, HI-STEEL provides greater strength with the same sectional thickness.

INCREASE LIFE

HI-STEEL lasts longer on the job. Its tight scale resists atmospheric corrosion four to five times as long as ordinary structural-grade carbon steel. It has been known to resist 12 times as much abrasion as ordinary structural-grade steel.

And Inland HI-STEEL is easy to fabricate. It can be worked either hot or cold—punched, drawn, or otherwise fabricated—welded or riveted—with little or no change in shop practice.

COMPARISON OF AVERAGE PROPERTIES OF HI-STEEL WITH ORDINARY STRUCTURAL GRADE CARBON STEEL

Tensile Properties (¼" Plate)	Inland HI-STEEL	Ordinary Structural Grade Carbon Steel
Yield Point (psi)	56,000	35,000
Ultimate Strength (psi)	73,000	66,000
Elong. in 8" (%)	25	25
Endurance Limit		
Fatigue Strength (psi)	49,000	33,000
Impact Resistance (Charpy Impact—ft. lbs.) Temperature		
80° F	55	36
32° F	43	33
0° F	36	26
—25° F	34	6
—50° F	30	2

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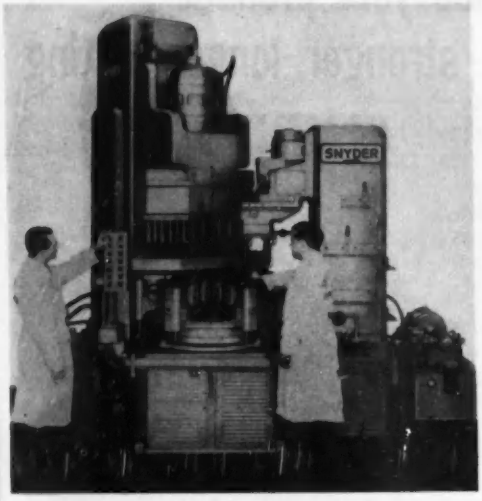
(*Continued from page 52*)



Snyder six-station vertical drilling and tapping machine for processing differential bearing caps.

J-53—Drilling and Tapping Machine

A six-station vertical drilling and tapping machine for processing differential bearing caps, designed and built by Snyder Tool & Engineering Co., Detroit, Mich.

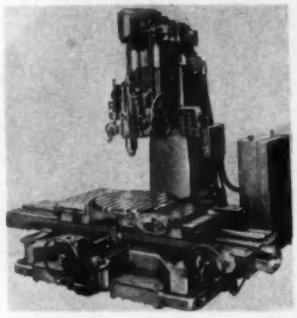
Spot-faces, chamfers and taps 480 caps an hr at 80 per cent efficiency and 512 at 100 per cent efficiency. Work cycle is 21 seconds and is automatic after starting button is pressed. The machine is electrically interlocked and can be operated by unskilled labor.

Four parts are loaded at station number one by the operator on the left and clamped by hydraulic pressure. The fixture is then automatically indexed by a standard Geneva index to the second station where eight large holes are drilled and four small holes are countersunk. All twelve holes are spot-faced at the third station, and, at the fourth, the four small holes are drilled and the eight large holes are finish-drilled. At the fifth station, the four small holes are tapped. The sixth station is for unloading, which is done by the operator on the right.

Tools are high speed steel mounted in standard Snyder multiple spindle heads which move on hardened and ground guide bars. All tools are gear driven, gears being 34 Rockwell, shaved and matched for quiet running. Tool speeds are 260 rpm for the larger drills and 1045 rpm for smaller drills. Stroke is three in. The stationary bushing plate is mounted on two bracket pins on each side of the fixture table. Tools are accessible for changing by simply raising the head.

The main spindle head is powered by a 25 hp motor, the tap head by a 2 hp motor, the Geneva index by a 2 hp motor, and the hydraulic tanks each have a 3 hp motor. One hydraulic tank serves the drill press and the other serves the clamping mechanisms.

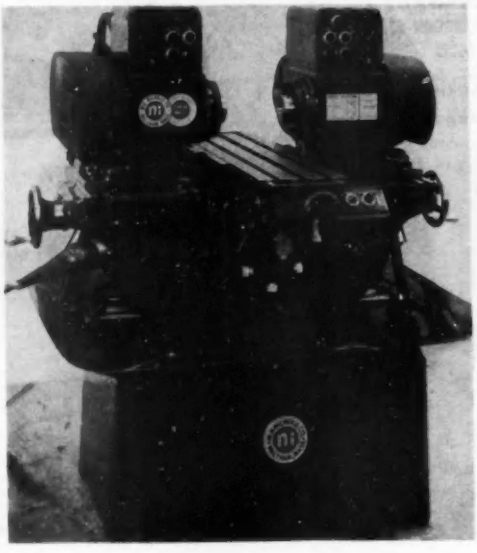
J-54—Built-in Rotary Jig Borer Table



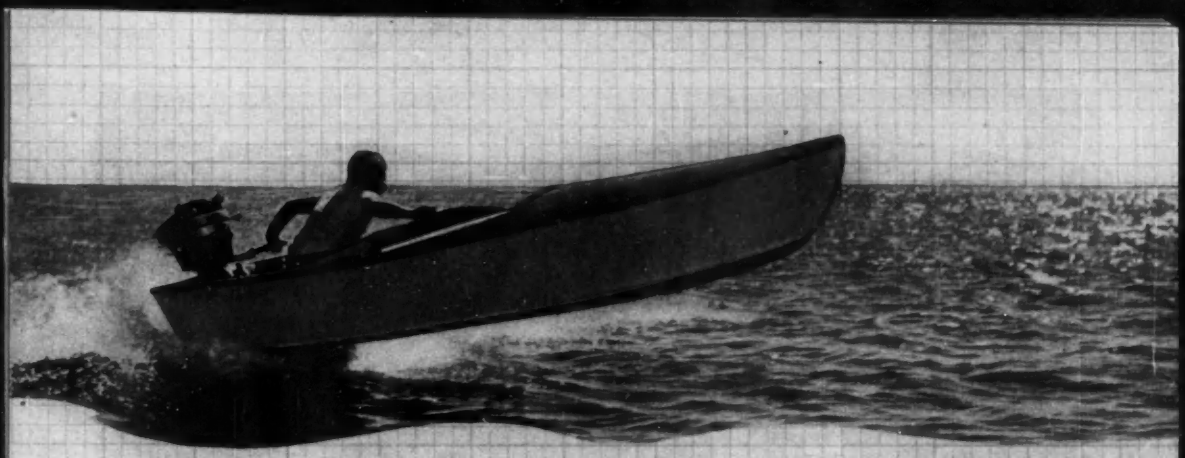
Pratt & Whitney, No. 4E jig borer with precision built in rotary table

A new design in jig borer tables brought out by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford, Conn.—available only on their new No. 4E jig borer—provides a large rectangular work area with ample T-slots for holding down work, as well as a precision built-in rotary table for cir-

J-55—Twin Mill for Machining Two Surfaces

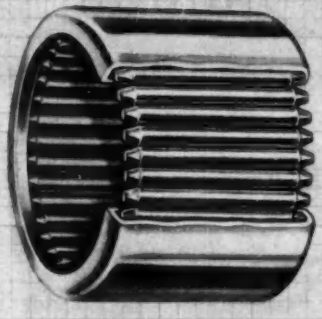


Twin Mill produced by W. H. Nichols Co., Waltham, Mass., machines two surfaces at once using one work-holding fixture and one set-up. The two geared milling heads are entirely independent motor driven units which may be adjusted horizontally, vertically, or longitudinally. Working surface of the table measures 8⅝-in. by 30-in., and maximum table travel is 14¾-in. Air pressure required for the pneumatic table feed is 75 to 120 psi. Two one-hp motors are used to drive the milling heads. Weight of the unit is approximately 1825 lb. Floor space required is 64-in. by 56-in.



Scott-Atwater shifts to higher efficiency

with TORRINGTON NEEDLE BEARINGS



Longer service life, smoother performance and exceptional efficiency are secured in Scott-Atwater outboard motors through the use of Torrington Needle Bearings.

Friction is reduced at crankpins, wristpins, crank shafts and propeller shafts operating in Needle Bearings. A leaner mixture of gasoline and oil can be used. This increases spark plug life and fuel efficiency, maintaining peak motor performance.

For an extra margin of efficiency, load capacity and service life, let our engineers help you apply compact Torrington Needle Bearings to your product.

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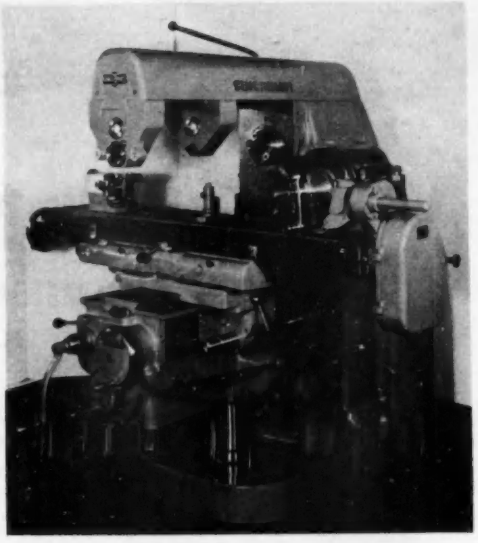
cular indexing and polar co-ordinate work. The overall rectangular dimensions of the table measure 36 in. by 78 in. and the rotary table is 48 in. in diam. Both rectangular and circular surfaces are accurately hand scraped for flatness. The circular surface is higher by 1.000 in. (±0.0005 tolerance) than the rectangular surface to provide clearance when indexing work larger than 48 in. diam. 1.000 in. parallels are placed on the lower rectangular surfaces to utilize the full 36 in. by 78 in. working surface.

To provide the maximum rotary work range for which the No. 4E jig borer is capable, the center of the rotary table is located 6 in. off center to the left in the rectangular table. This offset increases table travel between machine spindle and rotary table centerlines from 30 in. to 36 in., when traversed to the left.

Power rotation in either direction, controlled by push buttons, is provided for rapid indexing. Graduations in degrees are legibly marked on a beveled edge around the entire periphery of the table for approximate indexing. Precision settings to minutes and seconds are obtained through the slow motion hand control wheel. Indexing in either direction from zero and return to the original zero is within a spacing tolerance of ± 15 seconds in the full 360 deg of rotation.



Cincinnati milling machine, No. 3MI

J-57—Tool Room Milling Machine

A3 milling machine, built in plain and universal styles, and powered by a 7½ hp motor, has been brought out by the Cincinnati Milling Machine Co., Cincinnati, Ohio. Christened No. 3MI, it represents an extension of the Nos. 2ML and 2MI lines. Its wide speed and feed ratios are 60 to 1 and 120 to 1, respectively, and it features rapidity and ease of speed and feed change for all type modern toolroom milling.

Sixteen spindle speeds, ranging from 25 to 1500 rpm, are changed with a single crank type control. The crank operates a hydraulic selector valve, while the actual work of shifting gears is performed hydraulically. One-half turn of the crank, to the right or left, rotates the dial in the same direction to the next numeral, and meshes the proper gears for that speed.

Feed rates are changed in the same manner as speeds—one-half turn of a single crank type control, throughout the complete range of sixteen feeds, from ¼ in. to 30 in. per minute.

The main drive clutch is a single disk dry plate unit, with accessible adjustment. A multiple disk spring-loaded brake, operated by the disengaging action of the starting lever, stops the spindle instantly when the drive clutch is disengaged.

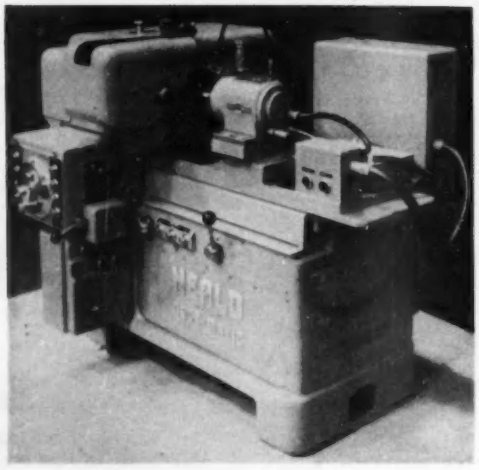
The vertical feed screw has its own lubricating system. Table ways and parts within the saddle and housing are lubricated by a manual pressure or "oil-shot" system built into the saddle. Arbor support bearings are automatically lubricated by a gravity system, from self-contained dust tight reservoirs. All reservoirs have their own individual glass sight level gages.

Feed controls are directional and independent of each other, and each feed lever has a forward, neutral, reverse position.

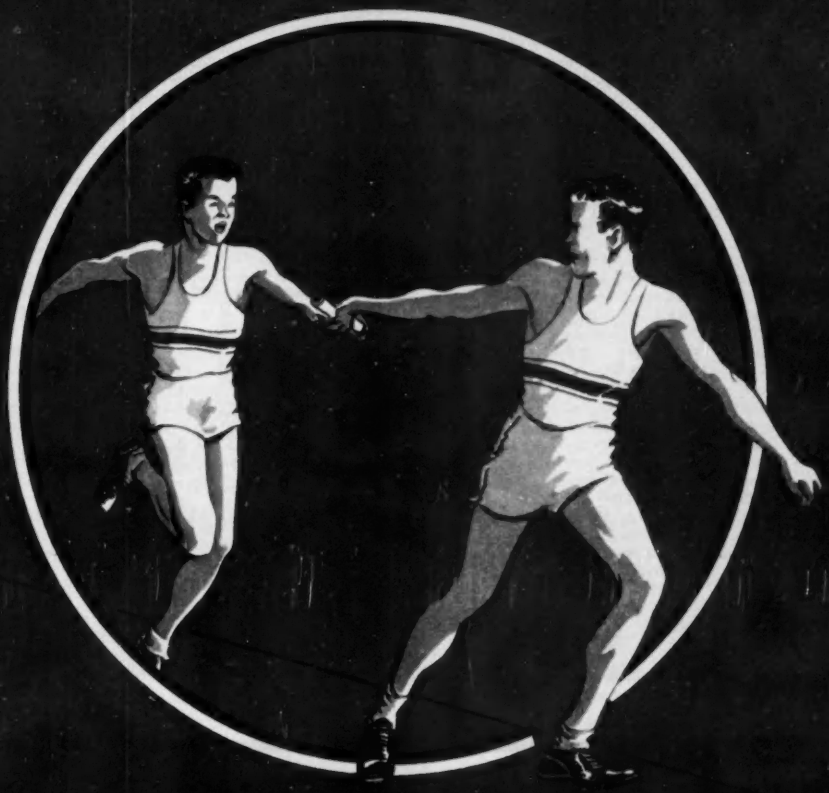
Cross and vertical hand cranks are automatically disengaged when their

(*Turn to page 70, please*)

J-56—Centerless Internal Grinder



New battery type centerless internal grinding machine, Model 180, offered by the Heald Machine Co., Worcester, Mass., is designed for battery installation and features a central hydraulic system. Central coolant supply adaptation as well as central power source for optional Hi-Frequency equipment are also available. Where large volume production is required these battery type installations are said to prove profitable. Completely automatic, several machines can be tended by a single operator.



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Publications AVAILABLE

New Industrial Literature listed in this department is obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

H-93 Aluminum & Magnesium Alloys

Eclipse-Pioneer Div., Bendix Aviation Corp.—A 24-page "Book of Facts" that contains a large amount of information concerning aluminum and magnesium alloys is available. Compositions, mechanical properties and specifications for the light metals as well as for brass and bronze casting alloys are presented in the form of tables. Design of castings, machining information, cleaning methods, chemical surface treatment, and painting procedures for magnesium and aluminum alloys are thoroughly covered. In addition, the book describes and illustrates some of the extensive and complete plant facilities at Eclipse-Pioneer for producing non-ferrous sand castings.

H-94 Magnetic Coolant Separators

Barnes Drill Co.—Bulletin 300-A contains information on several new sizes of the BarnesdriL Magnetic Coolant Separator. Line drawings and specifications are included together with installation photographs showing the various sizes on a variety of different machines. These photographs will assist in visualizing the ease of application.

H-95 Metal Cleaning

Oakite Products, Inc.—A new illustrated, 44-page booklet reviews metal cleaning in all its phases. After considering briefly the wide variety of soils—oil, grease, rust, etc., which result from fabricating operations such as heat-treating, forging, rolling, stamping, etc., the booklet discusses specific materials, equipment and procedures for most effective removal of these soils.

H-96 Precision Levels

Pratt & Whitney—An informative circular, No. 472-1, describes and illustrates the 15-inch Precision Level.

H-97 Arc Welding Equipment

The Linde Air Products Co.—A new folder describing the main features and specifications of HELIARC apparatus is now available. Equipment illustrated includes the following: 5 models of the torch for manual and mechanical operation, new argon regulator and flowmeter, especially designed to give accurate gas flows, and the argon-water shut-off valve.

H-98 Self-Locking Rings

Waldes Kohinoor, Inc.—A new catalog, Bulletin No. 5, covers a series of Waldes Truarc Self-Locking Rings. The catalog contains complete engineering data and specifications.

H-99 Carbide Tipped Tools

Whitman & Barnes Div., United Drill & Tool Corp.—Catalog No. 104 lists and illustrates taper shank drills, core drills, lathe centers, machine countersinks, dowel pin reamers, etc. Information on the use and care of these tools, as well as grinding information, together with suggested feeds and speeds when drilling or reaming various materials, is included.

H-100 Precision Lathes

South Bend Lathe Works—A new series of Light Ten South Bend Lathes are illustrated and described in an 8-page Catalog, No. L-10. Complete specifications and prices of this precision machine tool are given. Attachments and accessories are also listed for these lathes.

(*Turn to page 60, please*)

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Publications Available

(*Continued from page* 58)

H-101 Chemical Motors

Westinghouse Electric Corp. — B-4687, a new 4-page booklet, describes the new Life-Line Chemical Motors for operation in atmospheres where corrosive fumes and liquids are encountered. The booklet describes the internal construction features of these motors, plus the treatment of external parts for maximum corrosion resistance. Included are results of salt-spray corrosion tests and tests comparing the relative corrosion of shot-blasted cast iron and machined steel.

H-102 Maintenance of Fire Extinguishers

Ansul Chemical Co.—The company has designed a periodic inspection chart that helps fire inspectors keep accurate records of their extinguishers. Space for 26 inspections of up to 38 extinguishers is provided.

H-103 Heat Treated Alloy Steels

Joseph T. Ryerson & Son, Inc. — A new bulletin gives engineering data on two high performance alloy steels supplied in the heat treated condition, ready to use. Rycrome and Nikrome "M" are suitable for heavy duty axles and shafts, gears and pinions, etc. Data tables include minimum mechanical properties, test results, properties at high temperatures, and machinability ratings.

H-104 Production Control System

Chronolog, Incorporated — (Representing the National Acme Company)— An attractive, 2-color folder "How to Reduce Idle Equipment Time" gives information on the Model C-1 Chronolog. Advantages of this system of production control are given, together with a description of the machine, and work charts.

H-105 Hydraulic Diamond Turner

Cleveland Industrial Tool Corp.—A new illustrated brochure on the Citco Hydraulic Diamond Turner is available. Features of the Citco Hydraulic Diamond Turner mentioned in the brochure, include its adjustability to three ranges of degrees, its automatic control and its maintenance of a new and ever-ready cutting edge throughout the life of the diamond.

H-106 Four-cycle, Four-cylinder Diesels

Cummins Engine Co., Inc.—A new bulletin, No. 5291, contains complete specifications of all automotive and industrial models of HR-400 Cummins Diesels.

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8100 Lyndon Ave.

24 Volt Equipment Operates in Water

(*Continued from page* 51)

ened steel face, both lapped flat within three sodium light bands, or 12 millionths of an inch. The shaft is lubricated by means of a unique, gear-driven oiler supplied by a built-in oil reservoir. Lubrication and sealing problems for the distributor and starter shafts are similarly solved. Neoprene O-ring seals are used for external fitted parts.

Another unusual feature of the Auto-Lite equipment is the incorporation of the ignition coil in the distributor housing. This was done to simplify the waterproofing problem.

Small-scale production of the waterproof electrical units on Army order is currently under way at Auto-Lite.

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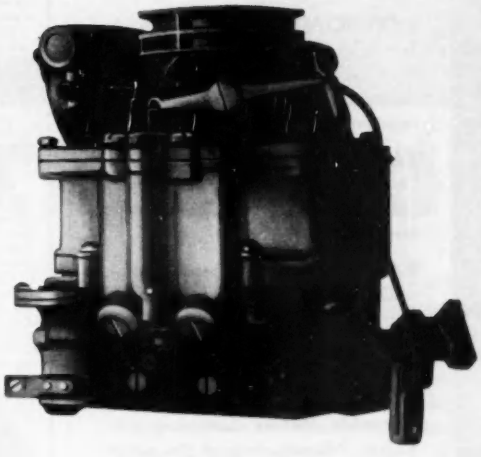

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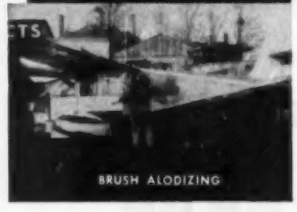

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Business in Brief

Written by the Guaranty Trust Co., New York, Exclusively for AUTOMOTIVE INDUSTRIES.

Business activity in general continued to increase during the week ended March 25. Department store sales, crude oil output, and construction were higher than in the preceding week, while electric power production, railway freight loadings, and bituminous coal production declined. The *New York Times* index of activity for the week ended March 25 stands at 157.1, as compared with 155.8 in the preceding week and 143.3 a year ago.

Sales of department stores during the week ended March 25, as reported by the Federal Reserve Board, equaled 278 per cent of the 1935-39 average, as compared with 264 in the week before. The volume of sales showed no variation from the corresponding distribution in 1949, as against a preceding advance of one per cent. The total in 1950 so far reported was three per cent less than the comparable sum in 1949.

Electric power production declined during the week ended March 25. The output was 10.9 per cent above the corresponding amount in 1949, as compared with an advance of 9.5 per cent shown for the preceding week.

Railway freight loadings during the same period totaled 717,233 cars, 1.1 per cent less than the figure for the week before, but 20.3 per cent above the corresponding number recorded in 1949.

Crude oil production in the week ended March 25 averaged 4,848,100 barrels daily, 4100 more than in the preceding week but 339,700 under the comparable output a year ago.

Production of bituminous coal and lignite during the same week is estimated at 12,370,000 net tons, 1,030,000 less than the output in the week before but 9,942,000 above the corresponding quantity in 1949.

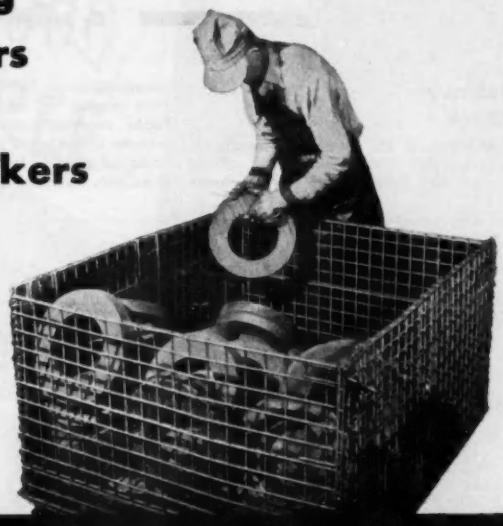
Civil engineering construction volume reported for the week ended March 30, according to *Engineering News-Record*, was $258,901,000, or 46 per cent more than the preceding weekly figure and 96 per cent above the comparable sum in 1949. The total recorded for 13 weeks of this year was 39 per cent more than the corresponding amount in 1949. Private construction for the period was 55 per cent above that a year ago, and public construction increased by 22 per cent.

The wholesale price index of the Bureau of Labor Statistics during the week ended March 28, at 152.1 per cent of the 1926 average, was 0.2 per cent less than in the preceding week and was 3.8 per cent below the corresponding figure in 1949.

Member bank reserves balances decreased $187 million during the week ended March 29. Underlying changes thus reflected include increases of $238 million in Treasury deposits with Federal Reserve banks, $13 million in Treasury cash, and $21 million in nonmember deposits and other Federal Reserve accounts, accompanied by an increase of $108 million in Reserve bank credit and a decline of $3 million in money in circulation.

Total loans and investments of reporting member banks increased $151 million during the week ended March 22. A decrease of $42 million in commercial, industrial, and agricultural loans was recorded. The sum of these business loans, $13,847 million, shows a net decline of $1115 million in 12 months.

among vendors to auto makers the trend is to . . .



CARGOTAINERS

One reason for the trend is that several large auto makers have already requested that vendors ship parts in collapsible welded-steel-wire baskets with eight-way pallet bases. They have specifically named CARGOTAINERS because they are the foremost and basic-patented product of this type. Auto makers are constantly looking for new ways to save time and money, just as you are. They have come to appreciate the value of receiving, storing, and adding products to the assembly line in CARGOTAINERS . . . . . then easily collapsing the CARGOTAINERS and sending them back to the vendor or their own intraplant supply point. *For details on how the CARGOTAINER system can simplify your own handling problem and save you money, write without any obligation to Pittsburgh Steel Products Company, Dept. AI, Grant Building, Pittsburgh 30, Pa.*

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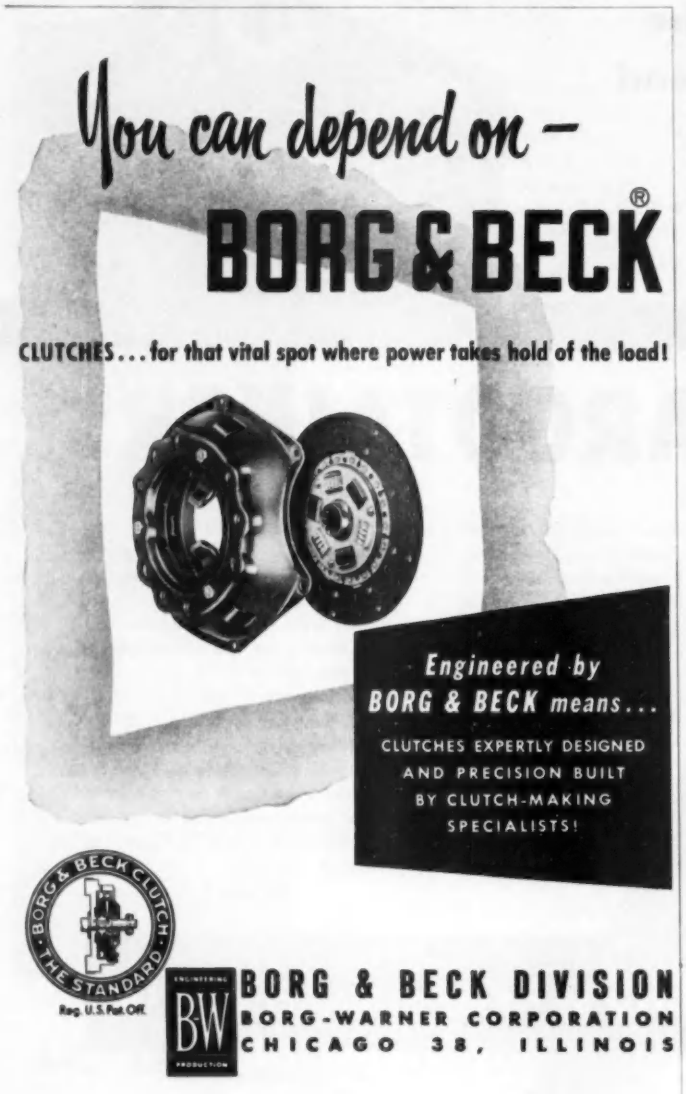
Observations

By Joseph Geschelin

Rabinow Clutch

Writing in the Ordnance magazine, March-April, 1950, Saunderson of the Bureau of Standards describes some possibilities of the Rabinow magnetic fluid clutch in military engineering. Some reports received from private sources indicate the probability that the so-called electric type automatic transmissions rumored in the past year doubtless are based upon utilization of the magnetic clutch principle. We also hear that one of the major producers of electrical machinery is doing some research work on the Rabinow clutch, possibly for automatic transmission application as well.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CLUTCHES... for that vital spot where power takes hold of the load!
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CHICAGO 38, ILLINOIS

Automatic Transmissions

We simply can't stop talking about automatic drives. For one thing we have been promised a disclosure of a hydraulic drive of positive type without gearing. That should be of interest to everyone. Too, we understand work is being done on an electric type transmission. We have no details on this since it is still in the confidential stage.

Mechanical Octanes

Among engine designers opinions are divided as to mechanical vs. chemical octane designs. Meanwhile, Willys-Overland has boldly stepped into the breach with an F-head adaptation of its well-known and widely used four-cylinder engine. Compression ratio is upped to 7.8 for high altitude operation and we are told that the engine appears to be free from carbon-consciousness. It is of interest that the Hudson Essex was first introduced with F-head in 1919 and continued until 1923. Later Hudson introduced the F-head on its Super-Six engine in 1928 and carried through to the 1930 season. Prominent proponents of the F-head in England are Rolls-Royce and Rover.

Machinery Purchases

Are there still those who feel that new equipment purchases have been lagging? Regardless of the national picture, the fact is that the automotive industries have been installing new machinery since the end of the war and are continuing without let-up.

Plastic Impeller

Durez is making excellent headway in promoting the use of phenolic molded water pump impellers as a replacement for gray or malleable iron castings. Back in '38 Durez was supplying molded impellers for one of the passenger car engines which was later taken out of production. Now Cadillac has an-

(*Turn to page* 68, *please*)

C/R *dependability costs you NOTHING*

Five thousand dollars for one oil seal! It isn't so startling to Chicago Rawhide engineers. Pilot oil seal models often cost that. And more. Research is costly. But C/R research saves money for you. It gives you the maximum of product dependability.

Since the days when Chicago Rawhide made the early automotive oil seals, C/R research has been applied to the solution of fluid retention and exclusion problems in every type of mechanism. This research has had just one aim: complete dependability under all circumstances. As a result, Chicago Rawhide has become the world's largest manufacturer of shaft-type oil seals. This C/R experience is important to you, because dependability can not be measured in ordinary specifications.

When you select C/R "Perfect" Oil Seals, you know they'll be right for the job. Each is specially engineered—correctly designed to assure dependable performance. C/R research helps you build a high degree of dependability in your own product. It costs you nothing.

Chicago Rawhide engineering service is always available for the solution of your particular sealing problems.

CHICAGO RAWHIDE MANUFACTURING CO.

1310 Elston Avenue **OIL SEAL DIVISION** Chicago 22, Illinois

Chicago Rawhide Manufacturing Company specializes in mechanical sealing and protective products: oil seals and special diaphragms, boots, gaskets, washers and packings of *Sirvene* synthetic rubber and *Sirvis* mechanical leather.

ENGINEERS: We will be pleased to send you engineering data on "Perfect" Oil Seals on receipt of your written request.

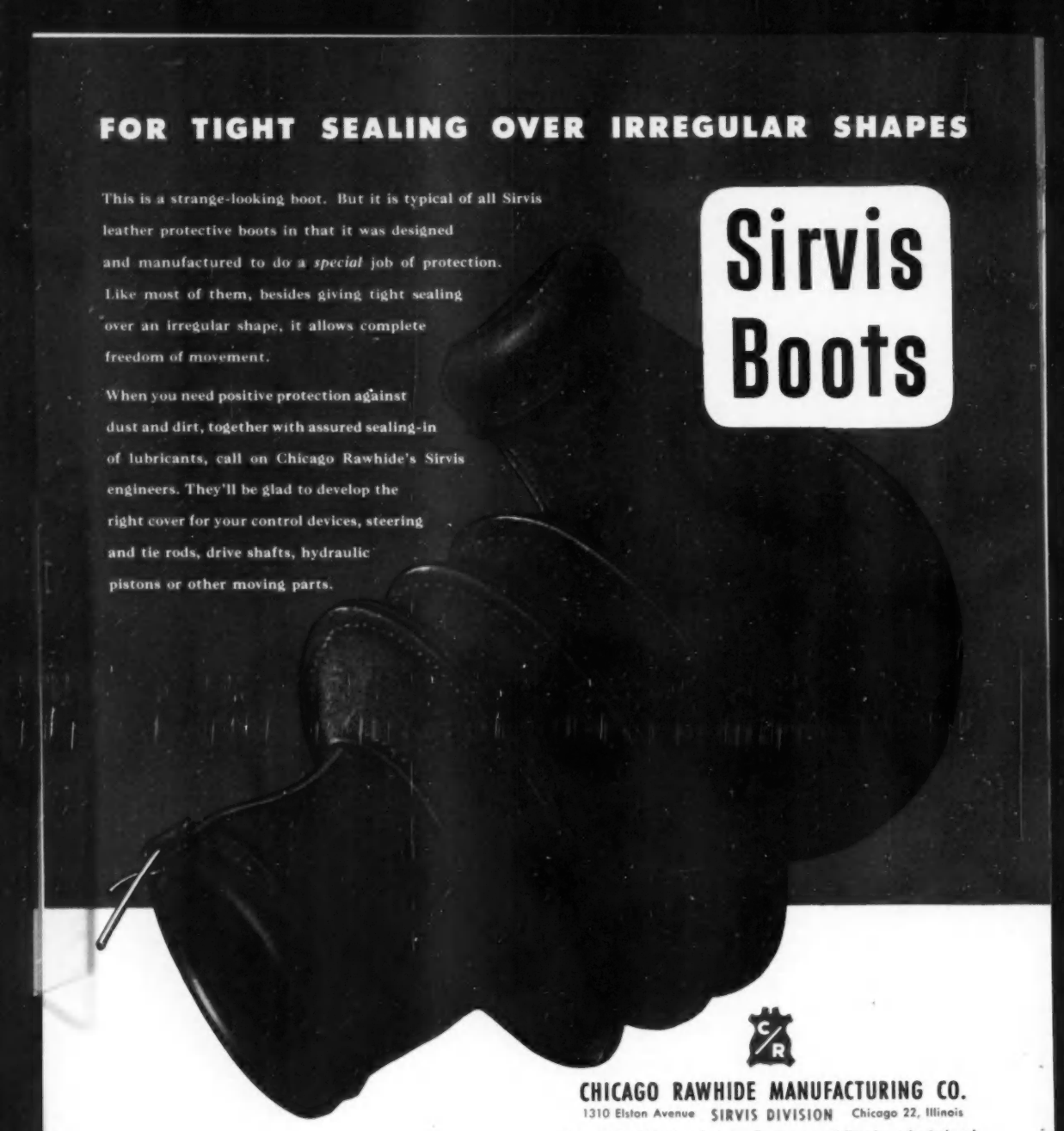
PERFECT *Oil Seals*

FOR TIGHT SEALING OVER IRREGULAR SHAPES

This is a strange-looking boot. But it is typical of all Sirvis leather protective boots in that it was designed and manufactured to do a *special* job of protection. Like most of them, besides giving tight sealing over an irregular shape, it allows complete freedom of movement.

When you need positive protection against dust and dirt, together with assured sealing-in of lubricants, call on Chicago Rawhide's Sirvis engineers. They'll be glad to develop the right cover for your control devices, steering and tie rods, drive shafts, hydraulic pistons or other moving parts.

Sirvis Boots



CHICAGO RAWHIDE MANUFACTURING CO.
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Chicago Rawhide Manufacturing Company specializes in mechanical sealing and protective products: oil seals and special diaphragms, boots, gaskets, washers and packings of *Sirvene* synthetic rubber and *Sirvis* mechanical leather.

For detailed information about Sirvis products, write for the free Chicago Rawhide catalog.

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Pittsburgh · San Francisco · Cincinnati · Kansas City · Syracuse · Peoria

Men in the News

(*Continued from page 25*)

Fairbanks, Morse & Co.—**Robert H. Morse, Jr.**, was elected President.

Boeing Airplane Co.—**Jay Morrison** has been appointed manager of the Gas Turbine project. Chief project engineer for the turbine's further development, will be **S. D. Hage.**

The Electric Products Co. — **E. G. Schroeder** has been appointed Sales Manager.

Tractomotive Corp.—**Marshall L. Noel** has joined the company as Vice-President and Treasurer.

Allis-Chalmers Tractor Div.—The appointment of **R. S. Stevenson** as General Sales Manager has been announced. Mr. Stevenson succeeds **Marshall L. Noel**, who recently resigned.

Wisconsin Motor Corp.—**Phil Norton** has been appointed General Sales Manager.

Imperial Brass Mfg. Co.—**James T. Greenlee** has been named Vice-President and Director.

Baker Industrial Truck Div., Baker-Raulang Co.—The election of **Robert H. Davies** as vice-president and acting general manager, and **Edward H. Remde** as vice-president, has been announced.

Sealed Power Corp.—The appointment of **Donald M. Hesling** as director of the newly established Research and Development Engineering Div. Assisting Mr. Healing will be **J. H. Bullard**, Chief Technical Engineer; **D. A. Paull**, Chief Metallurgist; **V. H. Bathrick**, Chief Machine Designer; **H. M. Olsen**, Consultant Engineer and **H. Kieldsen**, Engineering Change Coordinator.

Ahlberg Bearing Co.—**H. F. Hagenauer** has been appointed Purchasing Agent.

Christiansen Corp.—The appointment of **Walter Bonsack**, as Vice-President and Director of Research for the company, has been announced.

Tung-Sol Lamp Works, Inc.—**George W. Keown** has been appointed General Sales Manager.

Wilton Tool Mfg. Co.—**Lawrence M. Rich** has been appointed Vice-Pres. in charge of Sales.

Roto-Finish Co.—**C. Heamon Castle** has been elected Vice-President.

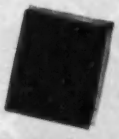
International Acetylene Assoc. — **Claude E. Monlux**, Vice-Pres., Linde Air Products, has been elected President of the Association.

Hood Rubber Co. — **Raymond H. Blanchard** has been elected President.

For Unexcelled Performance

HOOVER *the only* **BALL BEARING** *with* **HONED RACEWAYS**

Here are three pertinent reasons why you should consider Hoover Ball Bearings — with honed raceways. First, these bearings achieve unbelievable quietness. Second, they increase bearing life 90 per cent. Third they have a 30 per cent greater load capacity. When you specify Hoover Ball Bearings you secure these PLUS features without extra cost.



The Hoover Engineering Manual gives all the facts. Write for your copy.

THE ARISTOCRAT OF BEARINGS

HOOVER BALL and BEARING CO.
Ann Arbor, Michigan

New Casting Process Employs Thin Shell Molds and Cores

A new process for casting metals which is claimed to produce more accurate castings than those made in conventional sand molds is now under development. An additional advantage of the process is a large saving in the amount of sand required as the mold consists of only a thin shell.

Known as the Croning process, it employs a Bakelite resin-binder, developed by Bakelite Division, Union Carbide and Carbon Corp., for producing cores and molds from sand. Although resins have been used for many years in sand core bonding, the new method is a departure in that it does not require long baking and curing and uses relatively small volumes of sand.

Crown Casting Associates, Boston, announce they have applied for patents applying to various aspects of the process, which Crown says is a development of Johannes Croning of Hamburg, Germany. Crown is granting licenses to users.

The production of molds and cores by the Croning process is as follows:

(1) The pattern which forms a half mold is first heated in an oven. It must be made of metal because of the high temperatures.

(2) Fine sand and pulverized Bakelite resins are thoroughly blended and the dry mixture can be stored for a reasonable time in any quantity that may be required. When an excess of this mixture is applied to the hot pattern, the resin melts, forming a continuous coating over the surface. The excess can be removed by inverting the pattern.

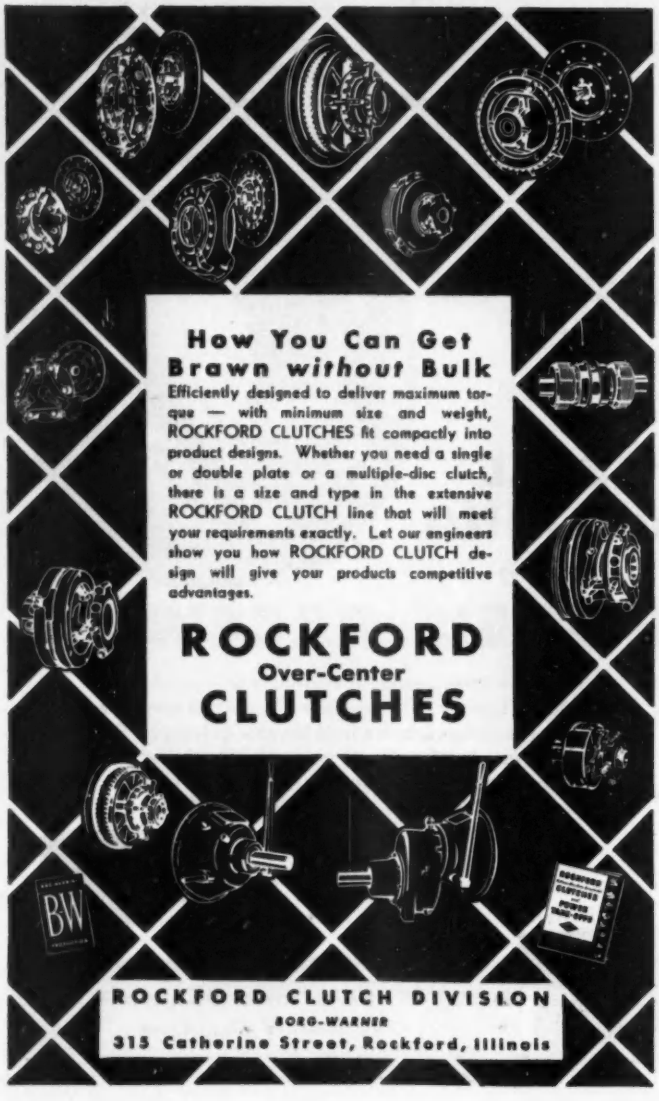
(3) The pattern with the adhering coating is placed in an oven for one to two minutes for further hardening. The half mold is removed from the pattern by means of knock-out pins.

Cores are made in the same manner, except that the resin-sand mixture is blown into a hot split core box by means of compressed air. Excess material falls out when the flow of air is stopped. The cores are, therefore, hollow and have the same wall thickness as the molds. Both cores and molds may be stored indefinitely until needed.

To prepare the mold for casting, two halves are held in a box with the gate vertical while the surrounding space is filled in with steel shot or some other suitable bedding material. The bedding supports the thin mold shell so that it will resist the hydrostatic pressure of the liquid metal.

Liquid metal is poured into the mold in the usual manner. The hot metal on coming in contact with the mold and cores is formed to the desired shape and surface finish. Gases generated pass readily through the mold shell, since the mold has very high gas permeability. The mold and core offer very little resistance to the casting as it solidifies and contracts, minimizing the formation of cracks or hot tears. Cores and mold can be removed by lightly tapping the casting.

It is said that the quality and precision of the castings are increased to the point where tolerances of from 0.002 to 0.003 in. per in. can be held. Where extremely close tolerances are required, usually only a finish cut is necessary rather than a rough cut followed by a finish cut. In some instances where holes are required in the casting they can be formed in the mold, and subsequent drilling eliminated.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Brawn without Bulk
Efficiently designed to deliver maximum torque — with minimum size and weight, ROCKFORD CLUTCHES fit compactly into product designs. Whether you need a single or double plate or a multiple-disc clutch, there is a size and type in the extensive ROCKFORD CLUTCH line that will meet your requirements exactly. Let our engineers show you how ROCKFORD CLUTCH design will give your products competitive advantages.
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315 Catherine Street, Rockford, Illinois

Observations

(*Continued from page* 64)

nounced the adoption of a phenolic impeller for 1950 engines. The molded impeller is said to have many significant advantages. In terms of specific gravity its weight is about 20 per cent of cast iron. It appears to be relatively unaffected by approved coolants. The molded parts can be made exactly to size, hence it requires no machining, and can be made with exceptional smoothness of surface, thus reducing fluid friction.

Baush offers Speed & Economy in Machining Automotive Cylinder Heads

This Baush 2-Way Heavy Duty Horizontal Hydraulic W-8 Type Multi-Spindle Drill has double-deck holding fixture to hold one (1) cylinder head in upper deck and one (1) head in lower deck while holes are being machined in both top and bottom faces. 90 spindles complete 3220 operations on 35 cylinder heads every hour at 100% efficiency.

UPPER STATION:

Drills — 12 Push Rod holes ½ way thru; 12 Valve Guide holes thru; 12 Stud holes ½ way thru

Counter bores — 3 Intake Valve seats; 3 Exhaust Valve seats

Core Drills — 2 outer clean-out holes

LOWER STATION:

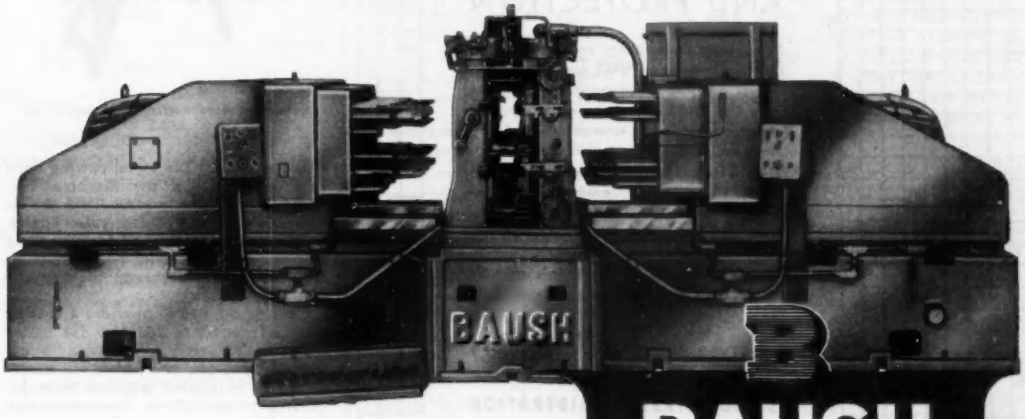
Drills — 12 Stud holes thru (to meet); 12 Push Rod holes thru (to meet)

Counter bores — 3 Intake Valve seats; 3 Exhaust Valve seats; 12 Valve Spring Washer seats

Core Drills — 2 center clean-out holes

Reams — 2 outer clean-out holes

MACHINE SPECIFICATIONS: W-8 Type horizontal end sections with hardened and ground steel ways . . . Individual hydraulic pumps & cylinders — 18" max. stroke . . . LH fixed center head — 40 spindles . . . RH fixed center head — 50 spindles . . . 2-40 HP spindle drive motors.



NOTE: An air operated elevator, not shown in this photo, is provided for upper and lower position loading of cylinder heads into fixture

BAUSH
MACHINE TOOL CO.
SPRINGFIELD 7, MASSACHUSETTS

ENGINE SPEED CONTROL

MILES-PER-HOUR RESTRICTION

OVER-SPEED PROTECTION

"FIRST NAME IN GOVERNORS"

PIERCE GOVERNORS

YOUR GUARANTEE OF SATISFACTORY ENGINE CONTROL AND PROTECTION

Time-proven dependability and precision performance have made PIERCE one of the world's largest governor manufacturers . . . offering more than 3,000 different types of centrifugal governor assemblies to meet every known governing problem.

Write for full information about: Pierce Engine-Speed and Road-Speed Governors for gas, gasoline and diesel engines . . . Pierce Servo Governors . . . Pierce Cable Driven Governors . . . Pierce Mercury-Arc and Micro-Switch Governors.

Pierce engineering service is always available for special design or governing problems.

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THE PIERCE GOVERNOR CO., 1615 OHIO AVE., BOX 1000 ANDERSON, INDIANA

NEW PRODUCTION AND PLANT EQUIPMENT

For additional information please use coupon on page 58

(*Continued from page* 56)

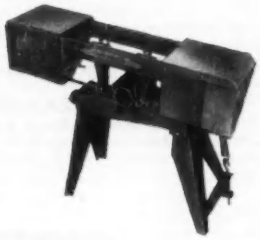
respective power feed levers are engaged. This arrangement safely prevents the hand control from spinning during the feed or rapid traverse movement.

"Live" rapid traverse, at the rate of 150 ipm longitudinal and cross, and 75 ipm vertical, may be engaged through a lever control at the side of the knee.

Like the overarms for other Cincinnati Milling Machines, the No. 3MI overarm is a rectangular shaped casting, fitted in dovetail ways at the top of the column. It incorporates a built-in "Dynapoise" unit, which dampens self-excited chatter.

Should the operator forget to shut off the current before opening the motor compartment door, a contact button on the door closing surface automatically breaks the circuit, immediately stopping the motor. Coolant equipment is included with the machine.

J-58—Metal Cutting Band Saw



Kalamazoo metal cutting band saw, Model 610-S.

Low-cost portable metal cutting band saw developed by the Machine Tool Division of the Kalamazoo Tank & Silo Co., Kalamazoo, Mich., cuts angles, bars, tubes, and pipe up to a capacity of 6 in. by 10 in. with no burr, minimum kerf, and accuracy to within a few thousandths.

This model, 610-S, provides 4 cutting speeds from 53 to 266 fpm for better matching of speed to material; a hydraulic dash-pot mechanism to insure constant, controlled pressure from beginning to end of cut; blade mounting from the top in 30 seconds; clear view of cutting operation with no yoke or frame to hide the work; and double sets of blade cleaning brushes.

The stand has 4 legs for stability, and the motor mounting takes any standard motor (1/3 hp, 110/60/1). The saw weighs but 198 lbs, and plugs into any convenient outlet.

(Advertisement)

COPPER ALLOY BULLETIN

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by BRIDGEPORT BRASS COMPANY "Bridgeport" Headquarters for BRASS, BRONZE and COPPER

Cutting Costs of Fabricated Goods

What can be done to cut fabricating costs of metal goods? This problem is uppermost in the minds of manufacturers.

Because of high labor, material and overhead, many have been operating dangerously close to the break-even point even during busy times. They realize how quickly profits can turn into losses if volume is reduced as little as 10%. Today's wary buyers are looking either for lower prices or higher values.

Among the likely ways to cut costs, fabricators are studying the following suggestions:

1. Simplification of products.
2. Elimination of operations.
3. Reducing finishing costs, extra operations and bad work.
4. Increasing operating speeds.
5. Changing methods of fabrication to reduce finishing costs.
6. Installing more modern labor-saving equipment.
7. Improving work-flow and materials handling.
8. Reducing maintenance through better materials.

Simplification of Products

Redesign has played an important part in cutting costs and increasing sales. For example, in builders' hardware, large, heavy front door locks with cast brass handles and escutcheon plates are rapidly being replaced by smaller, more efficient units. Cast door knobs and escutcheons are now made from brass stampings. The cylindrical lock body requires only two drilled holes for installation. Most old line products can stand simplification of design with corresponding reduction in operations and costs.

Elimination of Operations

It is often possible to increase the severity of drawing operations between anneals by changing the temper or by using a more ductile alloy, thereby eliminating an annealing operation.

Sometimes additional operations, not originally included in the original estimate, creep in. For example, a burr may have developed on a flange and instead of correcting the tools, a polishing operation is added. Extra costs such as this can be prevented.

Reducing Polishing Costs and Spoiled Work

Because finishing costs involve a large percentage of direct labor, careful control of annealing to produce small grain sizes and smoother metal, cuts down polishing time. Much also

Cast Brass Nut Wrought Brass Nut

Finishing costs lowered when changing from casting to wrought metal.

can be done through careful handling during various stages of manufacture towards preventing dents and scratches which are expensive to remove. Battery grouping of operations, specially-designed work trays, and good housekeeping are helpful measures.

Increasing Operating Speeds—More Modern Machines

Many manufacturers have succeeded in speeding up their machining operations by changing to copper-base alloys containing lead in varying amounts. Where compromise between much ductility and some machinability is required, small amounts of lead from 0.15 to 0.50% are helpful.

Installation of more dial and hopper feeds often permits speeding up of equipment resulting in higher production and lower unit cost.

Newer, more modern equipment may be the answer to lower costs if higher speeds are to be attained. Or, where volume warrants it, a change to equipment of the progressive operation type will increase production and reduce rejects.

Changing Methods of Fabrication

A manufacturer, tired of the excessive cost of polishing rough sand castings of brass, turned to brass screw machine parts, which could be polished on automatic equipment. Another replaced sand castings with parts made from tubing involving stamping operations.

Better Work Flow and Materials Handling

Rearrangement of machines and equipment to eliminate awkward handling; integrated departments to avoid unnecessary transportation from one room to another; more liberal use of modern conveyor systems and methods will increase production and cut labor costs.

Reducing Shutdowns and Maintenance Through Better Alloys

Corrosion, the enemy of all metals, is finding more opposition from copper and its alloys. Destruction from corrosion means expensive maintenance, shutdowns, repairs and eventual replacement—all of which involve high labor costs. As a result more attention has been given during the past years to specifying more corrosion-resisting alloys for vital parts.

Fabricators are turning more and more a listening ear to the suggestions which are made by employees. A careful study of even the smallest hint as to ways of increasing production may bring major savings.

Since the use of the correct metal and temper play such an important part in economical fabrication, manufacturers will find the services of our Metallurgical Laboratory helpful in solving their problems.

BRASS • BRONZE • COPPER • DURONZE — STRIP • ROD • WIRE • TUBING

MILLS IN
BRIDGEPORT, CONNECTICUT
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BRIDGEPORT BRASS COMPANY
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Established 1865
"Bridgeport" *District Offices and Warehouses in Principal Cities*

NEW PRODUCTS

FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 58

K-105—Production Control Instruments

Applicable to every production job that is subject to interruptions, the new Chronolog instrument, Model C-1, offered by Chronolog, Inc., Detroit, Mich. (who represent National Acme Co., Cleveland, Ohio), furnishes an indisputable minute-by-minute record of personnel and machine performance. For each machine to which attached the Chronolog counts, prints, keeps

Chronolog instrument for production control, a product of National Acme. Model C-1.

productive time and idle time, establishes production by periods and indicates reason for idle time, and provides comparisons on cost, payroll, and production figures.

The cause of discrepancies between rated efficiency and actual machine performance are immediately available from the Chronolog tape record either during operations or at the finish of each job or work shift. Corrective steps may then be taken.

The Chronolog instrument keeps a running record of time and a count of pieces produced on the job, and prints this information on a chart as easy to read as a typewritten report. It thereby furnishes a direct production-information link between shop employee and management.

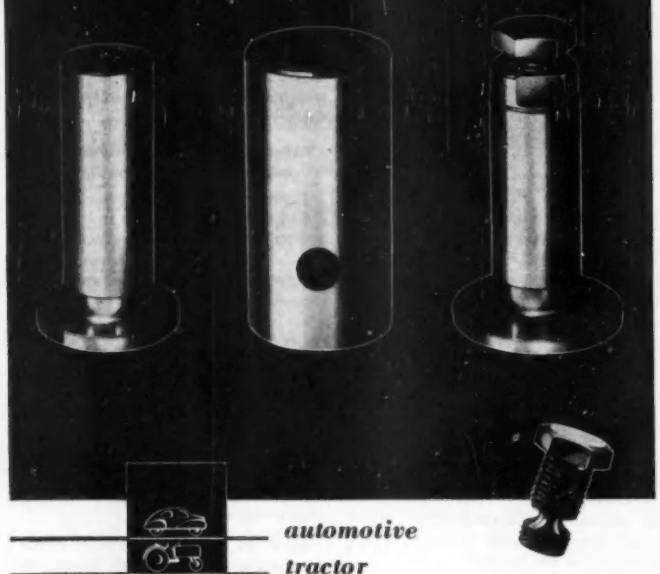
K-106—Conveyor Bearing Lubricator

Placed on the market by J. N. Fauver Co., Inc., Detroit, Mich., is an automatic lubricator for bearings in 1¼ in. diam wheels which run on a T-beam. Center distance between wheels is 16 in. Wheels have roller bearings which must be oiled frequently and automatically.

The lubricator provides four nozzels

JOHNSON TAPPETS

assure top grade quality and dependability in your engines. All the plus values of skilled craftsmanship, expert "know-how" and finest materials are automatically yours when you select Johnson Tappets.



automotive
tractor
industrial

The Johnson Self Locking Tappet Screw has proven most satisfactory in cast iron and steel tappets.

"Tappets Are Our Business"

JOHNSON JP PRODUCTS INC.

MUSKEGON, MICHIGAN

INCREASED BEARING EMBEDABILITY

means

INCREASED BEARING LIFE

DUREX-100 ENGINE BEARINGS

There's a very substantial reason why the greater embedability of Durex-100 engine bearings is a whole lot more than just a manufacturer's claim.

The proof is in the matrix. In Durex-100 bearings, the depth of the babbitt overlay *plus* the much greater depth of the matrix provides far more embedability than is found in conventional type bearings, where embedability is limited to the thickness of the babbitt alone.

And only Durex-100 bearings are constructed by Moraine's unique method of bonding. First, a layer of copper and nickel metal powder is applied to the steel back. These particles are then bonded together by a sintering process to form a porous matrix integrally brazed to the steel back. When the high-lead babbitt is cast, the molten metal penetrates the pores of the matrix, and thus is bonded mechanically, as well as metallurgically, to the matrix.

The unmatched high properties and consequent superior durability of Durex-100 have been confirmed in tests . . . proved in use. These *different* engine bearings are found in Cadillac, Buick, Oldsmobile, GMC, and other important makes of cars and trucks as original equipment. They can probably be used to advantage in the engines you manufacture, too—so why not get the whole story on Durex-100 from Moraine today?

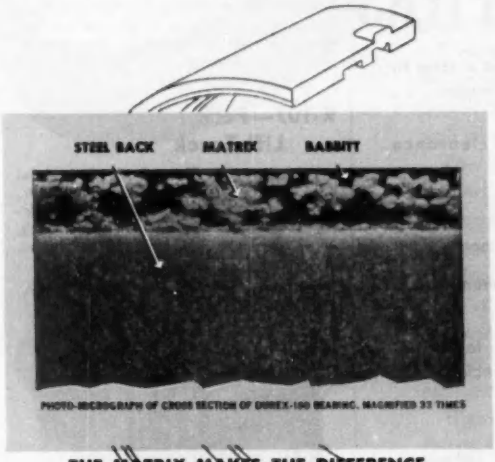


PHOTO-MICROGRAPH OF CROSS SECTION OF DUREX-100 BEARING, MAGNIFIED 32 TIMES

THE MATRIX MAKES THE DIFFERENCE

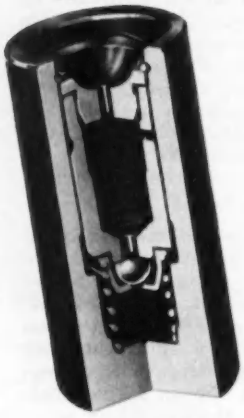
Steel-backed intermediate matrix of porous copper-nickel bonds mechanically, as well as metallurgically with thin high lead babbitt overlay.

MORAINE PRODUCTS
DIVISION OF **GENERAL MOTORS**
DAYTON, OHIO

Durex-100 Engine Bearings by Moraine

HYDRAULIC VALVE LIFTERS

Use Hydraulic Valve Lifters in your engine to put a stop to tappet noise and gain these five additional advantages . . .



1. Elimination of valve clearance adjustments.
2. Longer valve life.
3. Smoother engine performance.
4. Absorption of cam tolerances and runouts.
5. Automatic compensation for expansion and contraction of engine parts.

Let us tailor a Hydraulic Valve Lifter to your present or future automobile or truck engine design. Our current production rate is more than sixty-five thousand units a day.

Read the complete story of our Hydraulic Valve Lifters in this bulletin designed especially to inform automotive executives.

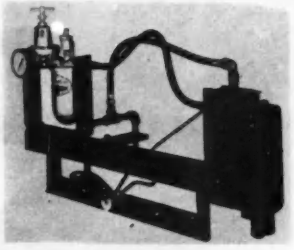
DIESEL EQUIPMENT DIVISION
General Motors Corporation
GRAND RAPIDS, MICHIGAN

NEW PRODUCTS

For additional information please use coupon on page 58

for directing oiled air jets to both the inside and outside of each wheel bearing. Conveyor speed is ten fpm.

As each pair of trolley wheels passes the lubricator, they trip triggers which automatically release jets of oil-fogged

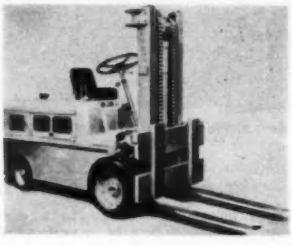


Fauver automatic lubricator for conveyor bearings in wheels operating on a T-beam

air directly into the wheel bearings. A regulator with back mounted gage is used for establishing a proper operating pressure of approximately 40 psi. Air pressure, volume of lubricant, direction and timing of "shot" are subject to easy adjustment.

K-107—Fork Lift Truck

Added to the line of the Industrial Truck Division of Clark Equipment Co., Battle Creek, Mich., is their Utilitruc-100, a 10,000-lb capacity fork lift truck, gasoline powered, with Dynatork Drive.



Clark 10,000-lb capacity fork lift truck with Dynatork Drive

The Dynatork Drive transmits engine power through a magnetic field, across an air gap, and eliminates any type of friction clutch. The conventional transmission is also eliminated, and replaced by constant-mesh forward-and-reverse gearing.

(*Turn to page 78, please*)

Inclusion-free high-carbon ferro chromium

assured by new process

MOST ball and roller bearings must take terrific punishment in service, and their dependability is based directly upon the quality of steel from which they are made.

To meet the requirements of the bearing manufacturer and his customers, the steelmaker can rely upon our newly improved ferro chromium to help him produce consistently high grade bearing steels.

The high-carbon ferro chromium we have recently developed is exceptionally free from non-metallic inclusions, entrapped slag and dissolved gases. It is made by a new process* which includes filtering out harmful inclusions by pouring the metal, as tapped from the furnace, through a layer of molten slag of special composition. In addition to removing the undesirable inclusions, this process also assures greater density of the metal and the absence of shrinkage cavities in individual lumps.

High-carbon ferro chromium contains 66 to 70 per cent chromium, 4 to 6 per cent carbon, and 3 per cent maximum silicon.

Our technical staff will be glad to demonstrate to you the benefits to be gained in your steelmaking by the use of this improved high-carbon ferro chromium. *Patented

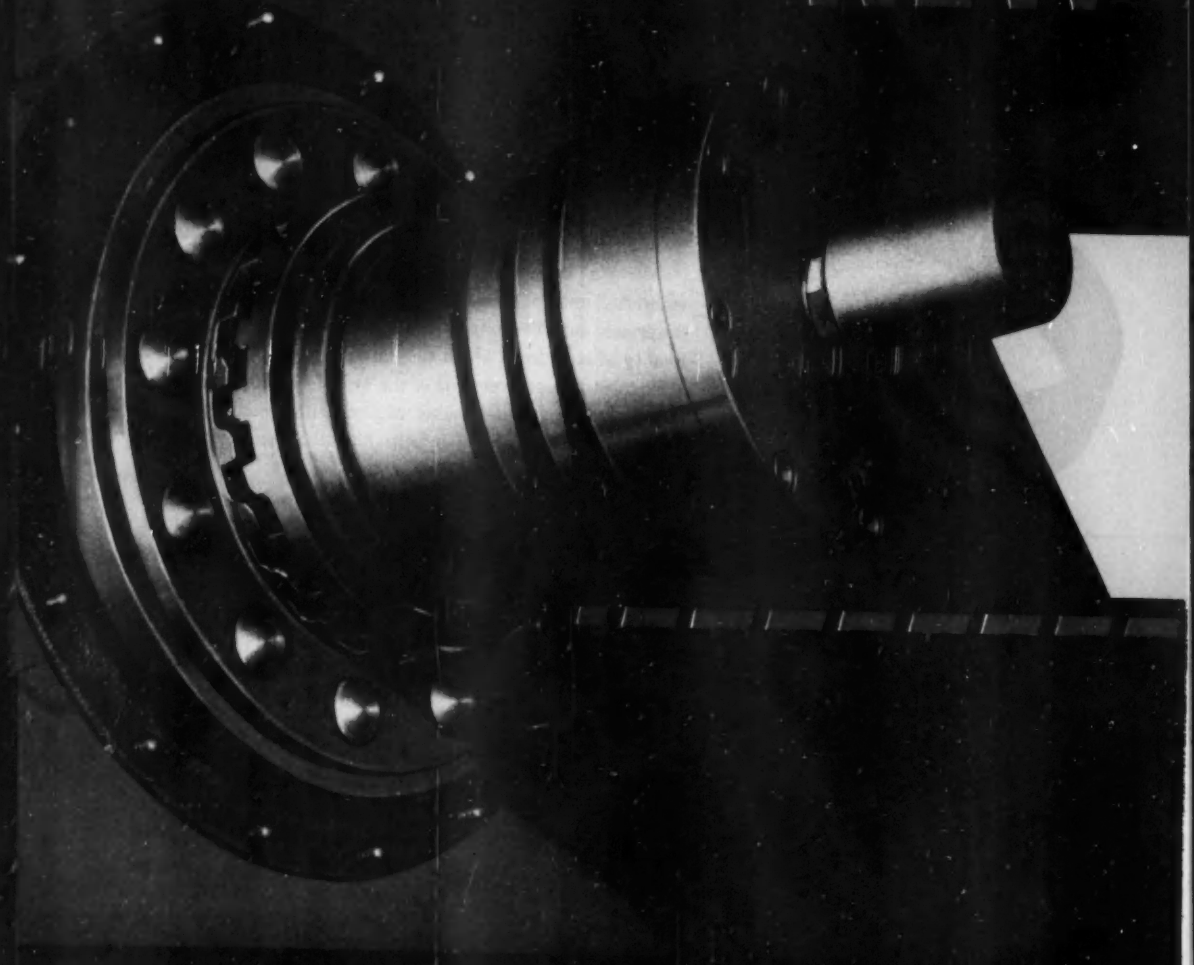
MAKERS OF ALLOYS VANADIUM CHEMICALS AND METALS

VANADIUM CORPORATION OF AMERICA

420 LEXINGTON AVE., NEW YORK 17, N. Y.
CHICAGO • DETROIT • CLEVELAND • PITTSBURGH

NIAGARA

NEW



This most revolutionary improvement in press design since Niagara introduced the world famous sleeve clutch in 1934 has been in the process of development and testing for many years. It is patented and there are patents pending.

Its high hourly output . . . its sturdiness . . . . its simplicity. . . its labor saving and maintenance economies . . . its safety features . . . are amazing.

ANNOUNCES

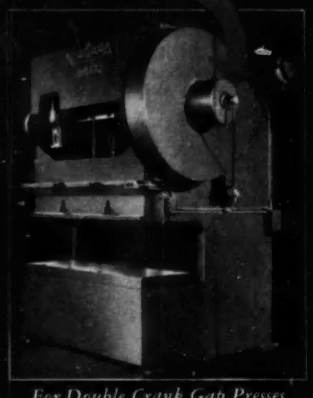
SLEEVE CLUTCH

electrically controlled air actuated

DeLuxe Control

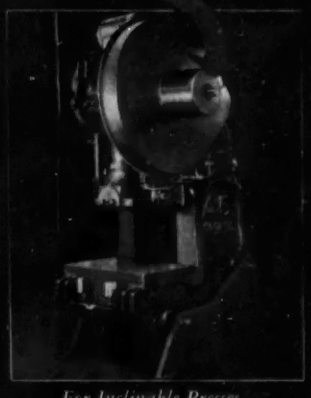
Note each one of these outstanding features:

1 Has all the advantages of a friction clutch.
2 Has all the advantages of a Sleeve Clutch.
3 Can be engaged or disengaged at any point in the stroke.
4 Can be jogged through the full 360° of crankshaft travel.
5 Can be stopped instantly, regardless of position of crank, by stop button, electric eye, limit switch or high frequency electric field.
6 Can be operated by palm buttons, foot switch or push buttons.
7 Can be operated single stroke or continuous.
8 Provides positive drive.
9 Has no friction members to wear.
10 Generates no heat.
11 Has low air consumption.
12 Makes instant engagement.
13 Provides effortless operation.
14 Is located on outside of drive wheel.
15 Can be completely removed without taking off the drive wheel.
16 Drive wheel next to frame . . . minimum overhang.
17 Drive wheel runs on antifriction bearings.
18 Gears and clutch run in a bath of oil.
19 Has few moving parts. Integral jaws and splines.
20 Presses so equipped are provided with air releasing brake.



For Double Crank Gap Presses

For Straight Sided Presses



For Inclinable Presses

NIAGARA MACHINE AND TOOL WORKS, BUFFALO 11, NEW YORK
DISTRICT OFFICES: DETROIT, CLEVELAND, NEW YORK

NEW PRODUCTS

For additional information regarding any of these items, please use coupon on page 58

(*Continued from page 74*)

A pivoted steering-axle assembly increases stability by maintaining all four wheels in constant contact with the road surface; and a 6-cyl Red Seal Continental industrial-type engine of 209 cu. in. displacement develops 50 brake hp at 1800 rpm.

Overall machine length is 107 in.; wheelbase, 66 in.; overall width, 50½ in.; outside turning radius, 104 in., and inside turning radius, 12 in., the machine turning readily in intersecting aisles of 88-in. width.

Designing For Leadership

WITH

Lamb Electric

MOTORS

Knowing the importance of efficient, dependable motor operation in winning product leadership, more and more design engineers are specifying Lamb Electric Motors.

Specially engineered for each product or device, Lamb Electric Motors provide the exact mechanical and electrical requirements for a specific application.

Our 34 years' experience in motor engineering frequently enables us to make product design suggestions which reduce product weight, provide compactness, improve performance, and lower cost.

THE LAMB ELECTRIC COMPANY
KENT, OHIO

Intermittent high torque motor with low weight factor is adaptable to many general applications.

Light-weight universal motor with efficient spur gear speed reducer for many types of portable equipment.

This small, sturdy motor can be readily adapted to a wide range of industrial applications.

Lamb Electric
SPECIAL APPLICATION FRACTIONAL HORSEPOWER MOTORS

K-108—Automobile Braking Roll Holder

Positive braking on all four wheels of automotive vehicles equipped with hydraulic braking systems is the feature of the new Rein "Roll Holder" now in production at plant of the General Armature & Mfg. Co., Lock Haven, Pa. This Roll Holder, a remote controlled electro-magnetic device, retains braking pressure on the four wheels following foot pressure on the brake pedal and the flicking of a switch before removing the foot from the brake pedal. Not one ounce of energy need then be exerted by the driver to keep the car braked. The vehicle holds firmly without roll or creep whether up-grade or downhill—while changing tires, awaiting traffic signals, etc. To proceed, a flick of the control switch to "off" position releases the brakes immediately.

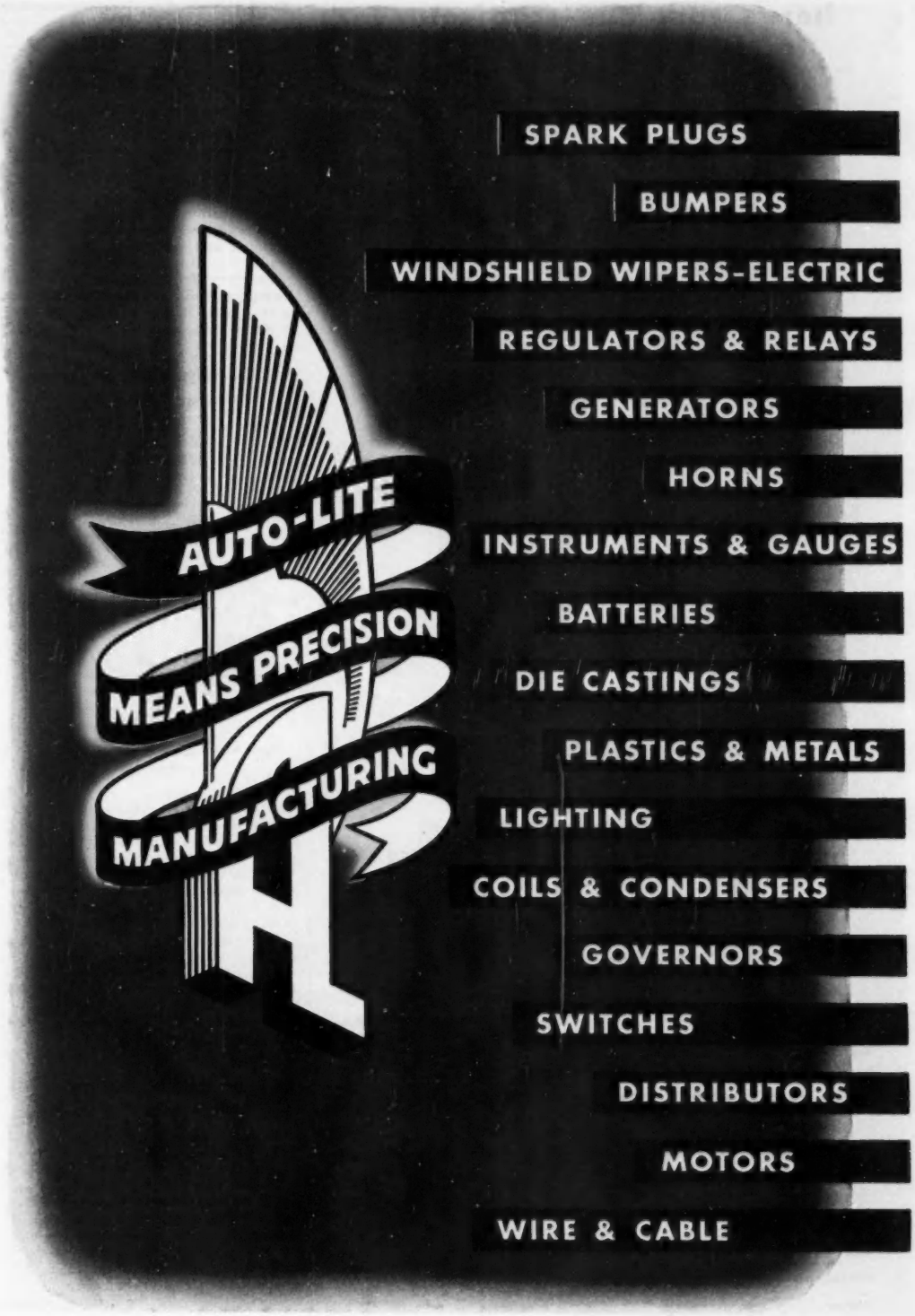
The Rein Roll Holder offered by the General Armature & Mfg. Co.

The Roll Holder provides finger-tip control on conventional type transmission cars—a hand operated switch fitted with a red light is mounted on the steering column. It provides toe-touch control on automatic transmission cars—through operation of a foot switch and red indicator light mounted on the instrument panel. In either application the lit light signals that the Roll Holder is in operation.

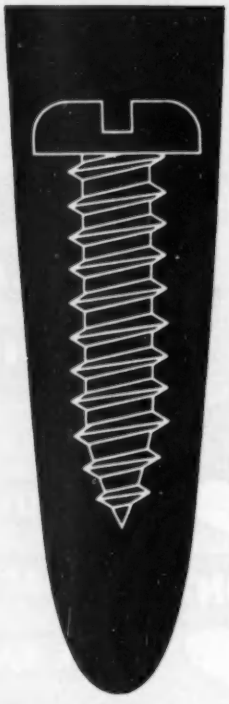
To prevent theft of a car when garaged or parked, a concealed toggle switch known only to the owner can be flicked to "on" position. The car, if stolen, travels until the brake pedal is depressed, at which point the brakes do not release unless and until the concealed switch is flicked to "off."

K-109—Drawing Compound

A field-tested drawing compound for use in the cold drawing of hot or cold rolled bars or rods is a product of E. F. Houghton & Co., Phila., Pa. This Houghto-Draw 357 is a heavy paste containing high melting point waxes and fats combined with a colloidal pigment. It has high adhesive properties, and is applied by simple immersion of the


AUTO-LITE
MEANS PRECISION
MANUFACTURING
SPARK PLUGS
BUMPERS
WINDSHIELD WIPERS-ELECTRIC
REGULATORS & RELAYS
GENERATORS
HORNS
INSTRUMENTS & GAUGES
BATTERIES
DIE CASTINGS
PLASTICS & METALS
LIGHTING
COILS & CONDENSERS
GOVERNORS
SWITCHES
DISTRIBUTORS
MOTORS
WIRE & CABLE

here's your one-stop source for fastening service . . .



BLAKE & JOHNSON Fastenings

1849 1950

Slotted or Phillips head machine screws, wood screws, stove bolts, tapping screws, special headed products; nuts, rivets, chaplets, wire forms, screw machine products . . . in steel, stainless steel, copper, brass, bronze, everdur, nickel, nickel silver, monel, aluminum . . .

THE BLAKE & JOHNSON COMPANY
WATERVILLE 48, CONN.

Please send me your new catalog containing full data on the complete line of Blake & Johnson fastenings.

Name .....

Title .....

Company .....

Address AI-4

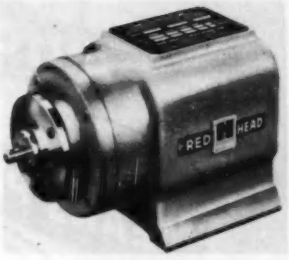
NEW PRODUCTS

For additional information please use coupon on page 58

work in a tank containing a solution of Houghto-Draw 357, 5 ounces to the gallon of water, maintained at 170 F. After draining and air drying, bars will be ready for drawing. Described as a replacement for the slower and dirtier liming practice formerly employed, bars drawn with it are reported to have brighter finish and smoother surface.

K-110—Wheelheads for Internal Grinding

The Heald Machine Co., Worcester, Mass., makes available Hi-Frequency wheelheads in a complete new line covering the entire range of sizes and



Heald Hi-Frequency Red Head Wheelheads for internal grinding

styles for internal grinding. These new Heald Hi-Frequency Red Heads come in eight different models covering the range from 6,000 to 100,000 rpm. The two smallest size heads have a combined range of 45,000 to 100,000 rpm and are arranged to take mounted point wheels.

The higher rpm Hi-Frequency Red Heads are designed to fill the requirements in high speed small hole grinding beyond the practical limits of conventional belt driven heads, and provide surface speeds heretofore unavailable with standard type heads.

K-111—Metal-Ceramic Materials

Metal-ceramic materials announced by P. R. Mallory & Co., Inc., Indianapolis, Ind., are a mixture of metals and ceramics having high thermal shock resistance, high strength at elevated temperatures, and good abrasion resistance. Also, these metal-ceramics have intermediate electrical and thermal conductivity, are machineable, and are suitable for electroplating.

Possible uses for the metal-ceramics

HOLLEY WAS FIRST to produce, for military vehicles, concentric carburetors that operate at full efficiency on extreme angles . . .
. . . and HOLLEY WAS FIRST to produce concentric carburetors for postwar passenger cars and trucks.
HOLLEY
Carburetor Co.
DETROIT 4
For Half a Century—
Original Equipment Manufacturers for the Automotive Industry

NEW PRODUCTS

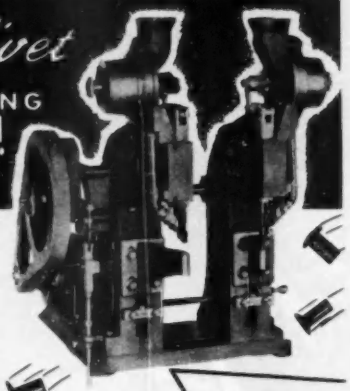
For additional information regarding any of these items, please use coupon on page 58

include dies for hot forming, containers for high temperature furnace work, jet engine and rocket components, flux resistant welding brazing fixtures, electrical contacts, and spark plug electrodes.

Mallory metal-ceramics can incorporate a dense metal at one end and metal-ceramic at the other end.

Chicago Rivet

AUTOMATIC SETTING SLASHES UNIT COSTS!



If your product involves a fastening operation—wood to wood, metal to metal, fabric to fabric, composition to composition, or any combination of these—you can slash unit costs by increasing production volume with high speed Chicago Rivet Automatic Setters and Chicago Rivet tubular or split rivets. Four rivets are automatically fed, inserted and upset at one release of the foot pedal by the quadruple model Chicago Rivet Setter. Single, double and triple setters are also available.

Bench type Double Rivet Setter with Adjustable Riveting Centers

Quick change hoppers, available as extra equipment, enable some models to switch quickly from one size and style rivet to another. Nearly all models clinch grommets, eyelets, staples and Dzus fasteners and insert drive screws—all automatically.

A Few Applications

AIRPLANE PARTS
AUTOMOBILE PARTS
BEAUTY PARLOR EQUIPMENT
BED SPRINGS
BELTS • BICYCLES
CAMERAS
CAN OPENERS
CANVAS GOODS
CARD TABLES
CASH REGISTERS
CLOCKS
COFFEE POTS
DOOR LOCKS
ELECTRICAL PARTS
FAN BLADES
FARM IMPLEMENTS
FILING EQUIPMENT
FIREARMS
FOLDING CHAIRS
FURNITURE
GARBAGE CANS
HARNESS
INDUSTRIAL BROOMS
INSTRUMENTS
IRONING BOARDS
KNIVES
LAMPS
LAWN MOWERS
LEATHER GOODS
LOOSELEAF BOOKS
LUGGAGE
MILK BOTTLE CRATES
NOVELTIES
POTS, PANS & PAILS
PULLEYS
RADIO PARTS
REFRIGERATORS
RUBBER GOODS
SEWING MACHINES
SHOES • SKATES
STEP LADDERS
STOVES
TELEPHONES
TOASTERS • TOYS
TYPEWRITERS
VENTILATORS
WASHING MACHINES

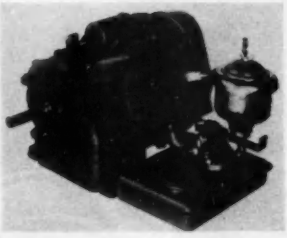
FREE FASTENING CLINIC

If your product is small, send us an unfastened sample. If it's large, send us a sub-assembly. We will gladly analyze your fastening problem, recommend the type rivet and Chicago Rivet Automatic Setter needed and estimate production rates that can be set up on the job.

Chicago Rivet CHICAGO RIVET & MACHINE CO.
9612 W. Jackson Blvd. Bellwood, Ill.

K-112—Air-Cooled Industrial Engines

Broadening their line of small air-cooled industrial engines with two new ultra-low profile models, Continental Motors Corp., Detroit, Mich., introduces the AC-5 developing ¾ to 1 hp, and the AC-6 developing 1½ hp. Both provide specially designed suction-type carburetor in conjunction with underslung fuel tank. The AC-5 extends the company's range below its former 1½ hp level.



Continental small heavy-duty air-cooled industrial engines, models AC-5 and AC-6, having overall height of less than 9½ in.

Models are single-cyl four-cycle L-head engines, having bore and stroke of 2⅛ and 2 in. respectively, displacement of 7.1 cu in. and compression ratio of 5.2-to-1. Like their companion models, they are designed for heavy duty. Power take-off end of crankshaft is equipped with ball bearings of large capacity, and cranking end with shoulder-type replaceable bronze bearing with integral thrust face. Exhaust valve is heat- and corrosion-resistant silchrome steel, seating in special alloy steel insert. Standard equipment includes oil bath air cleaner, dustproof and moisture-proof Wico flywheel-type magneto, blower housing, muffler, 1-quart fuel tank, air-vane governor, and rope starter pulley with rope and handle. Recoil or kick starter assembly, remote throttle control, ignition lock, and heavy-duty 6-1 reduction gear, which can be mounted in any of four positions, are available.

K-113—Tires of Jet Cold Rubber

Made with jet cold rubber, a new dual traction Silent Safety passenger car tire is being introduced by General Tire & Rubber Co., Akron, Ohio; designed for use of rayon fabric at the low pressures recommended. The outside shoulder construction eliminates shoulder stresses that original low pressure tires developed, it is said. It has a 10.5 per cent factor of safety.

The Silent Safety is the second premium passenger tire in General's line. The first is the Super Squeegee, first introduced in 1936 and re-introduced after the war. All Silent Safety tire treads will be made of General's Jet C. M. (cold mix) rubber.

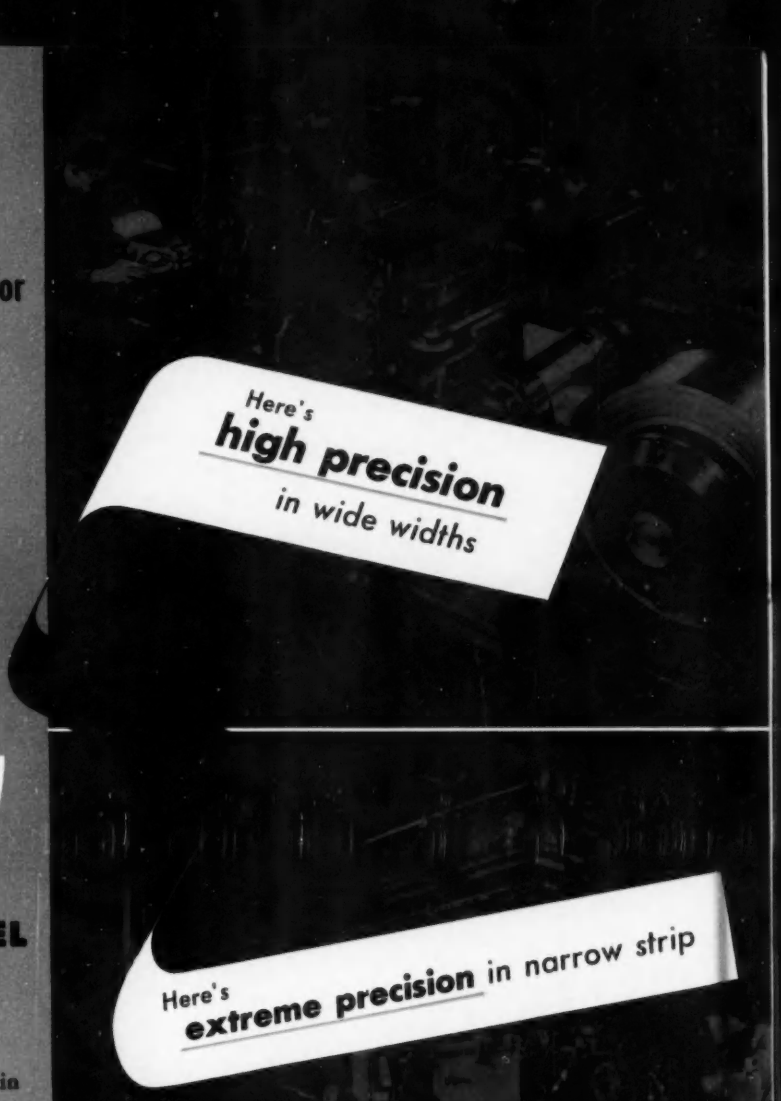
(*Turn to page* 85, *please*)

to meet the
ever-growing demand for

SUPERIOR light gauge STAINLESS STEEL

(as thin as .004!)

Superior Stainless Steel Strip in light gauges is produced on special cold finishing mills that are the most modern in the industry. Precision counts in light-strip uses . . . you get it when you specify SUPERIOR!



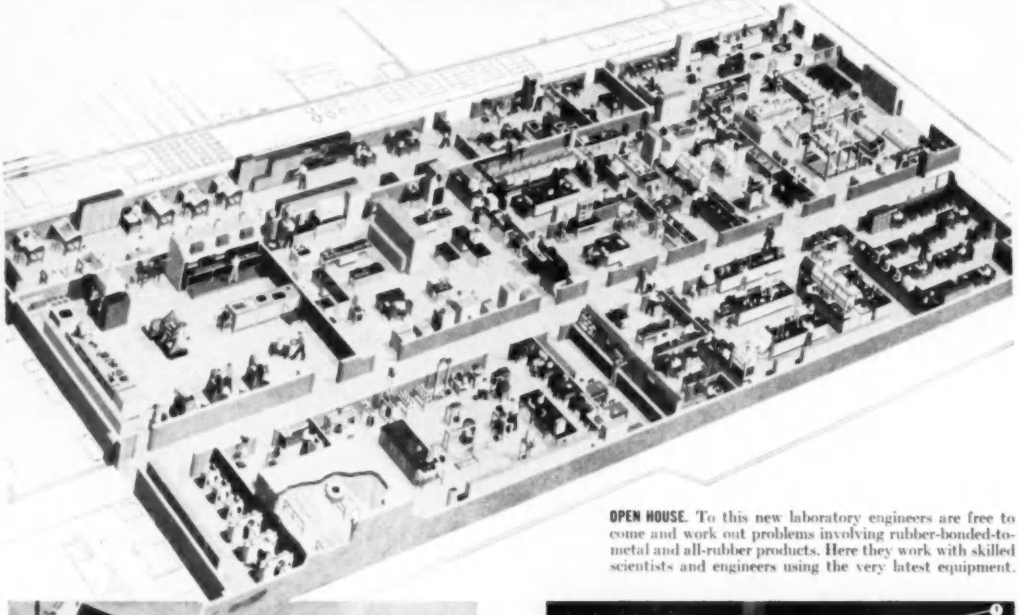
Serving these and many more applications

- Television Tubes
- Decorative Mouldings
- Weatherstrip
- Flexible Tubing
- Spring Temper Washers
- Gaskets
- Ball Bearing Separators
- Name Plates
- Automotive Trim
- Springs
- Shims
- Drawer Pulls
- Linoleum Bindings & Edgings
- Metal Tags
- Diaphragms

Superior Steel
CORPORATION
CARNEGIE, PENNSYLVANIA

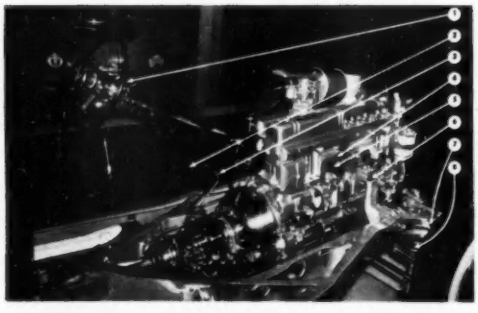
TREASURE HOUSE OF SCIENCE

Harmful vibration and noise in mechanical equipment eliminated in U. S. Rubber Laboratories, Ft. Wayne



OPEN HOUSE. To this new laboratory engineers are free to come and work out problems involving rubber-bonded-to-metal and all-rubber products. Here they work with skilled scientists and engineers using the very latest equipment.

ONE WAY IT PAYS OFF . . . a new "U. S." rubber Evener Bearing Assembly developed jointly at Ft. Wayne for this oil well pumping unit. Its simplified design eliminates 62 parts. Maximum shock protection allows 300% longer wear.



HERE'S ANOTHER . . . just 8 of 350 automotive applications for rubber parts developed in the Ft. Wayne Laboratory: 1) steering wheel. 2) brake lever pedal pad. 3) brake lever seal. 4) ignition wire. 5) ignition wire ferrules. 6) front engine mounting. 7) control arm rebound bumper. 8) spring bumper.

Are you concerned with reducing noise, vibration, shock in mechanical equipment . . . with reducing strain on individual metal parts? If so, U. S. Rubber Engineers invite you to work out your problems with them in their Ft. Wayne Laboratory —control center for the world's most modern Engineered Rubber Products Plant. Send for your copy of the new informative booklet, "This Is Your Laboratory." Write to Engineered Rubber Products Division.

A DEVELOPMENT OF

U.S.RUBBER
SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

ROCKEFELLER CENTER, NEW YORK 20, N. Y.

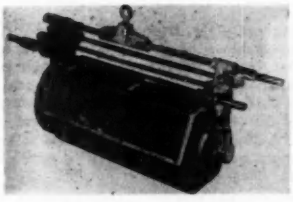
NEW PRODUCTS

For additional information regarding any of these items, please use coupon on page 58

(*Continued from page* 82)

K-114—Ribless Barrel Plating Cylinder

The Hanson-Van Winkle-Munning Co., Matawan, N. J., has brought out a Mercil Type Merlon ribless cylinder, in 14 in. by 30 in. size for use with all commonly employed plating solutions. The ribless cylinder is in hexagon shape, the body being made up of five covers. It has no ribs, no tie rods and no tie rod tubing. Merlon sheet stock is utilized for the covers with a dovetailed slot milled along the edge of each cover. The joining is made by a dovetailed piece of Merlon driven into each slot. The heads and ends of the covers are milled with a ¼ in. by groove and in assembling a ¼ in. by ½ in. Merlon key is fitted into the slot of the cover and also the head. The heads are joined to the ends of the covers with two flat head screws in each cover.



Merlon ribless barrel plating cylinder, a product of Hanson-Van Winkle-Munning

The cylinder employs flexible dangler, hair pin dangler or disk type contacts. Where flexible dangler contacts are used, the heads are furnished with Merlon bushings, and Merlon trunnions are used in the hangers. With hair pin dangler or disk contacts, steel trunnions with standard flanged type covers are supplied.

Where the flexible dangler contact is used, there is no chance of build-up of deposit on parts of the cylinder, the company points out, as the only place in the cylinder where current is available is at the end of the flexible dangler contact.

K-115—Arc-Welding Electrode

New improved arc-welding electrode, the W-2075, for producing fully machinable welds on cast iron has been announced by General Electric Co., Schenectady, N. Y.

Its wetting action and use in all

NOW you can get Grinding Wheels—especially made for your work—at no greater cost and without delay!

• BETTER FINISH
• LONGER WHEEL LIFE
• EASIER CUTTING
• REDUCED GRINDING COST

The factors listed at the right all enter into determining the *best* grinding wheel or disc for each job. Figure the odds in favor of custom-made wheels over stock grades in meeting these specific job requirements . . . and giving you better work at lower cost.

Besly-Titan is set up to produce grinding wheels and discs to *individual job specifications* at no more than you'd pay for ordinary stock wheels—and delivers in a few days! What's more, Besly-Titan field engineers work with you on the specifications. We'll *prove* the savings and work improvement you can gain from wheels and discs especially made for *your* work.

We're doing this for many large companies. We can do it for you. Write us.

BESLY TITAN

Engineers check for these variable conditions — and recommend Custom-Made Wheels to meet them exactly

Kind of Material
Amount of Stock Removal
Reliefs in Grind
Degree of Finish
Tolerances (flatness, parallelism, size)
Model of Grinder and Condition
Wet or Dry Grinding
Speeds of Work and Spindle
Fixtures or Free Hand Grinding

Write for FREE CATALOG

Lists all types and sizes of wheels and discs.

BESLY

TAPS—the world's most accurate tap.
TWIST DRILLS AND REAMERS—Complete line for every need.
TITAN ABRASIVE WHEELS AND DISCS—individually formulated for your job.
GRINDERS that reduce costs on every type of surface grinding.

CHARLES H. BESLY & COMPANY

118 N. Clinton Street • Chicago 6, Illinois
Factory: Beloit, Wisconsin

NEW PRODUCTS

For additional information regarding any of these items please use coupon on page 58

positions on either a-c or d-c current gives greater flexibility. Composition of pure nickel-core wire and an extruded black coating that is consumed in the arc gives a low volume of slag. Its stable arc results in weld deposits that are color matching and of machine-like appearance, which offer increased resistance to cracking the company reports. The electrode is designed to operate at low currents, which minimizes brittle heat-affected zones in base materials. Range of sizes and the welding current required are from 3/32 in. diam, 50-70 amp to 3/16 in. diam, 120-160 amp. All diameters are supplied in 14-in. lengths.

DEPEND ON *Mitchell* FOR THESE

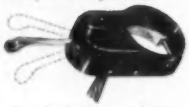
SPECIALIZED PRODUCTS

- Ignition switches
- Turn signal switches
- Rolled shapes

Mitchell ignition switches, turn signal switches and rolled shapes meet the most exacting specifications of the automotive industry for quality and excellence of design. You will find these Mitchell products widely used by leading manufacturers of cars, trucks, buses and tractors.

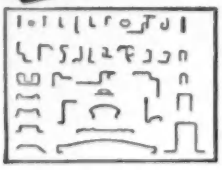
AUTOMOTIVE IGNITION SWITCHES

Installed as original equipment on many popular-make motor cars, trucks and buses, Mitchell ignition switches are known for their sturdy construction and extra long life. "Radio" position available without extra cost.



Mitchell clamp-on and screw type semi-automatic turn signal switch for trucks, cars, buses, tractors.

Mitchell 6-wire concentric type semi-automatic turn signal switch used in passenger cars.



TURN SIGNAL SWITCHES — Mitchell semi-automatic, self-cancelling turn signal switch affords motorists an easy, positive method of indicating right or left turns — gives pedestrians and approaching and following vehicles accurate, fully visible turning information.

ROLLED SHAPES—Mitchell offers a complete range of metals, designs and gauges in stainless steel, aluminum, brass, bronze, copper; cold rolled, drawn and pressed for automobiles, airplanes, architectural requirements, railroad cars, radios, television receivers, all industrial uses.

Our sales engineers work with you in the application of Mitchell products to your specific designs. Call on us at any time.

UNITED SPECIALTIES COMPANY

MITCHELL DIVISION • PHILADELPHIA 36

IGNITION AND TURN SIGNAL SWITCHES • ROLLED SHAPES • DOVETAILS

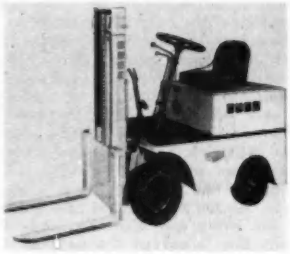
UNITED AIR CLEANER DIVISION • CHICAGO 28

AIR CLEANERS • METAL STAMPINGS

K-116—Fork Lift Truck

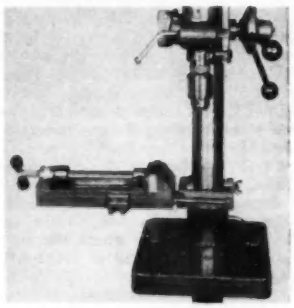
The Buda Co., Harvey, Ill., introduces a 2000 lb fork lift truck in models FA-20-24 and FPA-20-24. Both models are rated at a 24 in. load center for greater lifting capacities which permit handling loads of 2220 lb at 20 in. and 2600 lb loads at a 15 in. load center.

New steering axle, new style solid carriage plate, redesigned forged forks, adjustable deluxe cushion operator's seat, larger diameter steering tires, and interchangeable masts are incorporated in both the deluxe cushion tire model FA-20-24 and the pneumatic tire model FPA-20-24. Standard mast has a collapsed height of 64½ in. with an 85 in. lift.



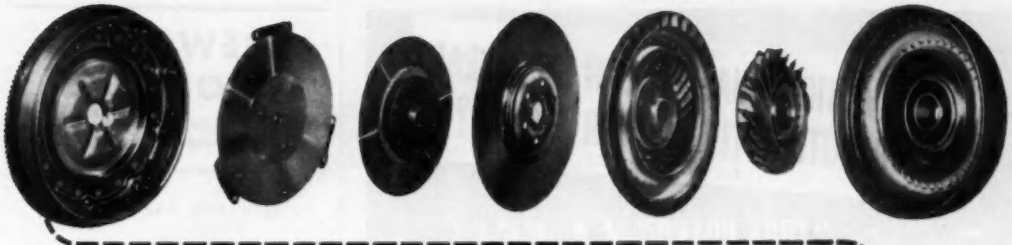
Buda 2000 lb fork lift truck, models FA-20-24 and FPA-20-24

K-117—Safety Drill Press Vise



Universal Vise and Tool Co., Parma, Mich., discloses this new safety drill press vise for fastening to round column drill presses by means of an adjustable attachment unit. The vise will fit columns from 1 5/16-in. to four-in. in diam. It has a maximum jaw opening of six-in., jaw height of 1½-in., and jaw width of 4-in.

(*Turn to page 88, please*)



THE LONG TORQUE CONVERTER

We have perfected a new torque converter for the automotive manufacturer.

A highly efficient unit, it has been designed for velvet-smooth power transfer with torque multiplication of better than 2 to 1 at stall.

Converter is direct air-cooled for simplicity and trouble-free service.

The various units of the assembly are fabricated from stampings, with a minimum of copper-brazing, for low-cost manufacture.

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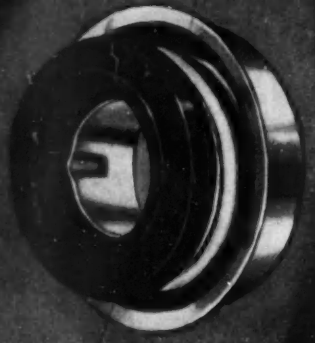
LONG MANUFACTURING DIVISION
BORG-WARNER CORPORATION
Detroit 12 and Windsor, Ontario

TORQUE CONVERTERS • CLUTCHES • RADIATORS • OIL COOLERS

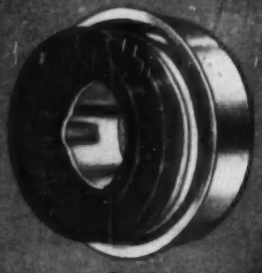
NEED A HIGH QUALITY, LOW COST SEAL FOR AUTOMOTIVE WATER PUMPS?

Try this "JOHN CRANE" 6A SEAL

- *Cartridge-type*—quickly and easily installed on production lines; simple to replace.
- *Service-proven*—millions in use on small shafts, such as ¼", ⅜", ½" and ⅝".
- *End-face Sealing* eliminates all shaft wear. Once installed, this seal lasts for years.



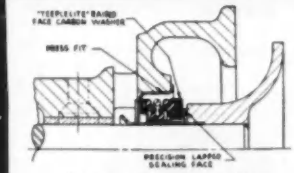
For shaft sizes over ⅜" up to ⅝".



For shaft sizes over ⅝" up to ⅞".

For shaft sizes ⅞" and smaller

ALWAYS SPECIFY "JOHN CRANE" SEALS. Our engineers in 32 field offices make sure that your installation stays *right*.



Typical water-pump assembly

JOHN CRANE

PACKINGS AND MECHANICAL SEALS

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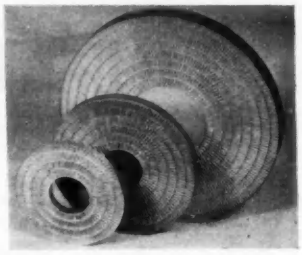
Offices in All Principal Cities in United States and Canada

NEW PRODUCTS

For additional information please use coupon on page 58

(*Continued from page* 86)

K-118—Triangular Prism Disk File



Triangular prisms of strong, hard Kennametal, 90.0 Rockwell A, are copper-brazed to the face of a steel back-up plate, in a number of courses, to form a new disk file with a multiplicity of sharp cutting edges. Brought out by Kennametal, Inc., Latrobe, Pa., these files are so shaped, grouped, and positioned as to provide a 30-deg negative axial rake, a 60-deg clearance angle and a 10-deg negative radial rake. Developed for non-ferrous metals and plastics, the recommended speeds range from 5000 to 7000 sfm for the harder materials, and 8000 to 9000 sfm for soft or gummy materials. These disk files may be mounted on a grinder, abrasive disk machine, motor end, or disk file machine by means of a special adapter.

K-119—Grinding Attachment

This Sta-Ga-Co master grinding attachment was recently announced by the Star Gauge Co., Springfield, Mass. Used for grinding flats, cylindrical surfaces, tapers, slots, radii, and splines on a surface grinder, it incorporates a sine-plate and rotary index head with Vernier. Its accuracy for vertical angles is 0.0001-in. in 2.5-in., rotary angles with index head within one-min., rotary angles with Vernier within two-min, roundness (spindle) within 0.00005-in., and spindle runout at nose is within 0.0002-in.

Don't take the transmission for granted

Plenty of horsepower—but nowhere to go . . . Not until the transmission puts the horsepower to work. Even the most skilfull driver is helpless to get the most out of his engine and rig without the *right* gear ratios.

The *right* gear ratio for every expected, and unexpected, road and load condition—that's one of the most important problems in *balanced* truck operation. Horsepower alone can't solve it.

That's why it pays to specify Fuller Transmissions—and Fuller Auxiliaries. Then, you have the advantage of a *complete* range from which to choose.

Don't take the transmission for granted in the equipment you design. Be sure, and specify Fuller geared-to-the-road-and-load heavy-duty Transmissions. Write today for literature to help you select the right transmission for every job.

where horsepower goes to work

Fuller TRANSMISSIONS

FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO 13F, MICHIGAN

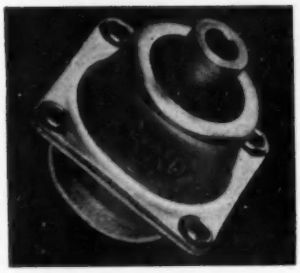
Unit Drop Forge Division, Milwaukee 1, Wis. • WESTERN DISTRICT OFFICE (SALES & SERVICE—BOTH DIVISIONS), 1060 E. 11th Street, Oakland 6, Calif.

NEW PRODUCTS for AIRCRAFT

FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 58

T-9—All Metal Shock Mounts

Shock mounts and vibration isolators of all metal have been placed on the market by Robinson Aviation, Inc., Teterboro, N. J. These Robinson Vibrashock Met-L-Flex unit mounts are designed to isolate vibration equally



Robinson Vibrashock Met-L-Flex unit mounts

well under positive or negative loading and at the same time to be effective as shock absorbers. Standard sizes are adaptable to aviation, industrial, and commercial applications.

The all metal mounts operate uniformly over a wide temperature range and overcome limitations of organic materials in arctic or tropics, at altitude or sea-level. Temperature range can be further extended by using special nickel alloy in place of standard stainless steel Met-L-Flex.

High damping action is provided through interwire friction in each Met-L-Flex cushion, reducing amplification at resonance and effective structural stability. Permanent set rate is declared negligible. Under- and over-load to 35 per cent is acceptable. All metal cushioning materials do not deteriorate in presence of oil or moisture.

T-10—In-Flight Refueling Boom

Flying boom in-flight aircraft refueling system developed by Boeing Airplane Co., Seattle, Wash., alleviates some difficulties of earlier refueling which was by gravity flow from tanker plane to receiver plane through a flexible hose.

The boom permits Air Force aircraft to refuel in flight with greater speed and at higher altitudes than previously possible. As the planes fly in formation—the tanker in front and slightly above the receiver—the boom is telescoped down and out from beneath the

(*Turn to page 94, please*)

As more and more reliance is placed on signal lights to indicate the intention to turn in the operation of motor vehicles, it becomes increasingly important that the driver know that his signals are working. The TUNG-SOL Flasher provides for a safety pilot light on the instrument panel, as well as a thoroughly reliable means of actuating the signal itself.

The safety pilot light does more than indicate that the switch is "on." Normally, it flashes in unison with the front and rear signal lights. When it fails to function with the switch on, it warns that the circuit is out of order and that the signal is not flashing.

PILOT LIGHT makes direction signaling safer

Millions of TUNG-SOL Flashers have been performing faithfully for the past ten years. Ordinarily, they last for the life of the car. They start instantly, work crisply, consume little current and are unaffected by ambient temperatures. *Write for bulletin.*

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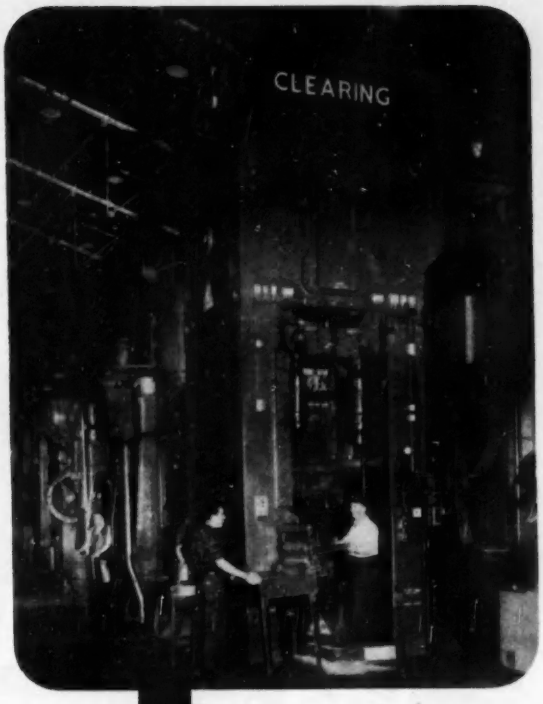
TUNG-SOL *signal* FLASHERS

AUTO LAMPS • ALL-GLASS SEALED BEAM LAMPS • ELECTRON TUBES



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AN IMPORTANT FACTOR

IN COST DETERMINATION

"Determining Costs" is usually a statistical operation to find out the expenditure required to obtain a specified result by specified means. But there's another meaning—perhaps even more important in today's markets. If you choose methods and machines wisely, you are making sure that you'll have minimum costs under any conditions.

Clearing presses are playing a big part in that kind of cost determination. One example is this big 1100-ton double action press, photographed in the plant of Ford Motor Company of Canada, Ltd. Production speed, accuracy of output, long die life, low maintenance costs . . . Clearing presses have what it takes to make cost sheets look mighty good.

We'll be glad to show you what Clearing can do on your product in your plant. Just ask us.

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from rubble to roadway...

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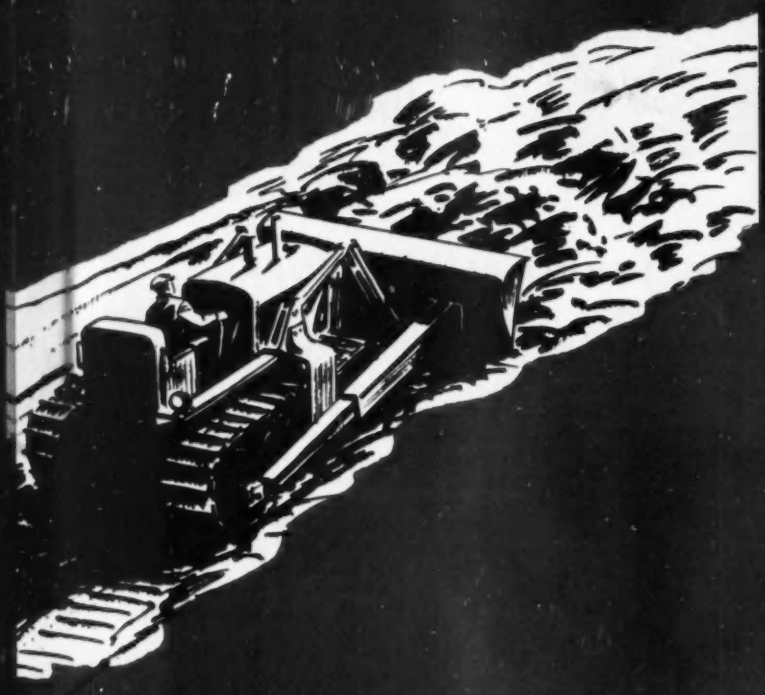

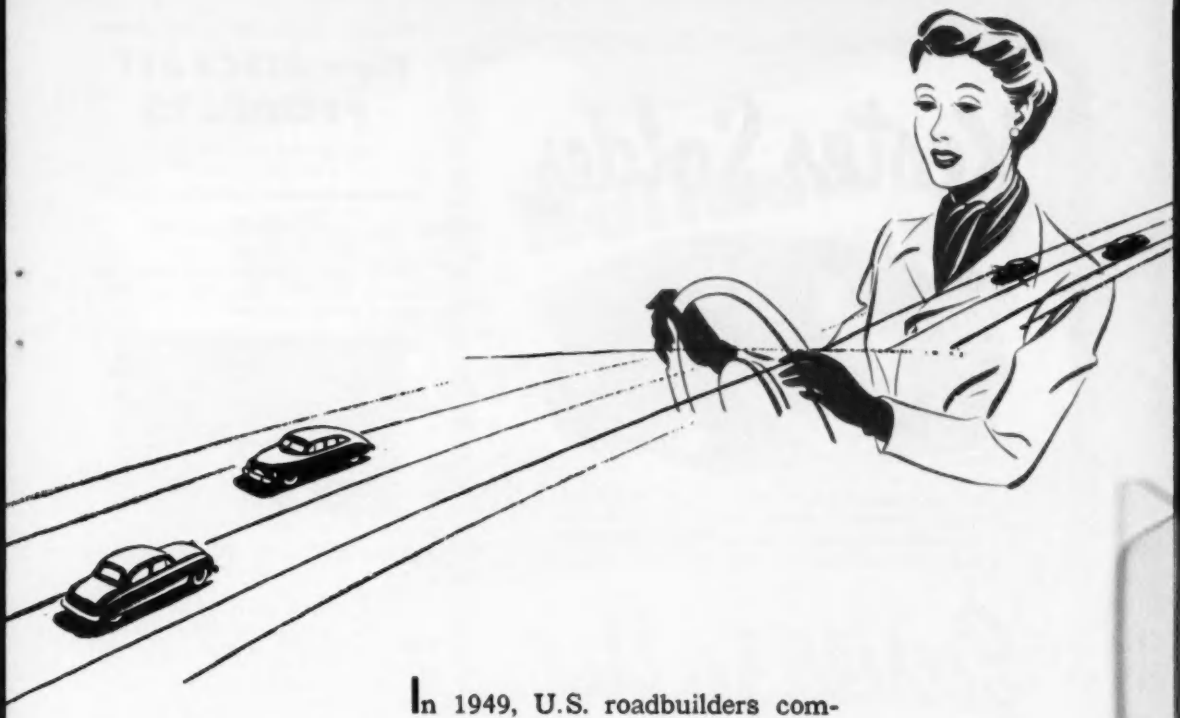

In 1949, U.S. roadbuilders completed 60,000 miles of new construction . . . a record year! Giant earth-moving units helped make this record possible; and R/M friction materials, in large measure, helped keep these units going. R/M performance, in this industry as in so many others, is the best recommendation for calling on your R/M representative in all problems of design and supply of friction materials.

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Kester Solder

Kester engineers, with over 100,000 different types and sizes of solder available, will specify the right flux-core solder that will give maximum efficiency and economy to the job.

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Using the most suitable solder for each operation will enable solderers to work at top speed without sacrificing quality. Waste is eliminated and rejects are held to a minimum.

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Kester Solders are made only from newly mined grade A tin and virgin lead. Fluxes—chemically and scientifically correct.

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Send for free manual, "SOLDER and Soldering Technique."

KESTER SOLDER

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New *AIRCRAFT* PRODUCTS

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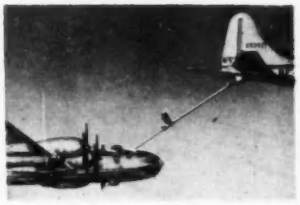
(*Continued from page* 90)

tanker and is inserted atop the nose of the receiver. Fuel then is transferred under pressure.



Boeing flying boom for pressured refueling in flight

The fueling tube is controlled through use of small vee-shaped surfaces, known as "ruddevators," which govern movements of the fueling boom. A crewman in the rear turret of the tanker plane operates the "ruddevator" controls and

(*Turn to page* 112, *please*)

Airbriefs

(*Continued from page* 50)

using four Allison T-38 units of 2750 hp each. Douglas believes that the change would show substantial advantages for the DC-6A Liftmaster cargo version, which would usually fly higher and farther between stops than does regulair airline DC-6 and DC-6B.

Glenn L. Martin Co. hastens to point out that its new 4-0-4 is adequately engineered to take two Allison T-38 units, should a customer so desire. Martin had originally designed the model 3-0-4 for turboprop power using the General Electric TG-100 unit, later abandoned. Martin has studied the experimental installation of two T-38 units for more than a year and probably would have raced to beat Convair's project had its "intelligence system" worked more effectively. Lockheed remains adamant on its insistence that the Government absorb the cost of any turboprop or turbojet transport development, although numerous studies have been made of turboprop and turbojet versions of the Constellation, as well as several original designs. Rumors that Howard Hughes might secretly subsidize a new Lockheed gas turbine transport, as he did in the case of the Constellation, are circulated but generally discredited. Insiders, however, still pick Lockheed to be first in the pure turbojet transport race, still a year away.

Wean-Hallden

LOW COST SYNCHRONIZED AUTOMATIC SHEAR LINES

THE installation of a Wean-Hallden Synchronized Automatic Shear Line assures you the most efficient shearing operation available today. The Wean-Hallden, while actually requiring *less floor space*, delivers up to *twice the production*. Infinite variable lengths from 12-inches to 12-feet at speeds up to 200 FPM with accuracy better than commercial tolerances means faster production, reduced labor costs and minimum scrap loss for you. *Before You Buy—Investigate Wean-Hallden.*

Wean *Equipment Corporation*

CLEVELAND, OHIO

Packard Marine Reverse Gear

(*Continued from page* 31)

cylinder remaining vented.

When the valve is moved to reverse, a cross channel lines up the oil passage from the pump with another to the reverse brake operating cylinder, this time the passage to the clutch operating cylinder remaining vented.

The oil pump, responsible for supplying fluid under proper pressure for the various maneuvers, is of rotor type, having but two moving parts, the inner rotor being splined directly to the main driving shaft. Oil for lubrication is delivered at around 75 psi at 3200 rpm. The oil supply for the reverse gear is entirely separate from the engine oil supply, although oil recommendations are the same.

The multiple-disk forward-drive clutch, contained in the carrier housing, consists of a clutch hub, a pressure plate, and a set of 12 bronze driving disks and 12 spring-steel driven plates. Driving disks are internally splined to the clutch hub. Six steel pins in the carrier housing engage notches in the drive plates. To assure positive and quick clutch release, each of the driven plates is convex shaped and so assembled that the dish in successive plates is opposite in direction. When the clutch is released, it is held by six coil springs spaced in notches around the periphery of its driven plates.

Clutch engagement is effected by hydraulic pressure acting against an annular piston which operates in a cylinder attached to the forward end of the carrier housing. To prevent oil leakage, the piston is fitted with two oil rings—one in an outer groove, the other in a groove around the inner diameter. The clutch has unique automatic, self-adjusting features which are said to go far to reduce maintenance and adjustments.

The planetary gear system includes a front and rear bevel gear and four bevel pinions, the latter being mounted on a trunnion, all enclosed within the carrier housing. The front bevel gear is splined to the main driving shaft and turns in the direction of engine rotation. The rear bevel pinion is splined to the propeller driving shaft and is free to turn in either direction. In forward drive it turns in the direction of engine rotation; in reverse, it rotates in the opposite direction.

The reverse maneuver is effected by means of the reverse band, holding the carrier stationary. The band is faced with a molded asbestos lining. Band actuation is effected through a simple linkage from the reverse band piston which operates in a cylinder at the top of the reverse gear housing. In neutral or forward drive the piston is held in released position by means of a large coil spring. For reverse, the piston moves downward and pushes the long arm of the brake lever downward to rotate a cone socket formed in the short arm. The free end of the reverse band moves in the direction of engine rotation.

Besides using ball bearings, Packard provides the unit with steel-back bronze lined sleeve bearings, and six thrust washers. The four pinion washers are of sintered copper-tin alloy; while the washers for the two bevel gears are of bronze bearing metal.

Oil tightness of the assembly is secured by means of three principal oil seals—one at the tail shaft coupling, one for the main shaft at the engine end, and the third at the control valve. These seals are of self-contained, self-adjusting, and self-lubricating type.

Manufacturers of...

HARDENED and GROUND PARTS

for over 40 years

KING PIN

SINCE the day of the duster and goggles, The Brown Corp. has meant highest quality precision parts for the automotive industry. Today, Brown Parts serve trucks, tractors, trailers, buses, axle builders, off-the-road machines and Diesel locomotives. The production methods and facilities we have developed are unexcelled — uniform product quality is assured—deliveries are reliable—service is efficient. Ask any of our long list of satisfied customers throughout the industry.

For further information about our specialized production of hardened and ground automotive and industrial parts, just drop us a note. We invite an opportunity to quote on your work.

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Parts include . . .
King Pins
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. . . anything in the hardened and ground line, of any analysis steel, up to 4¼" diameter.

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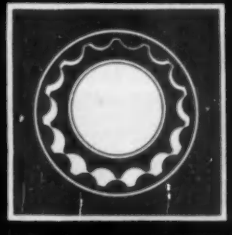
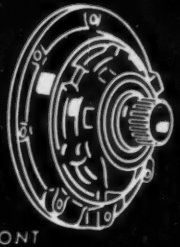
for Hydraulic Transmissions
Provide Silent Operation,
High Efficiency





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of Around-the-Shaft Transmission Pumps

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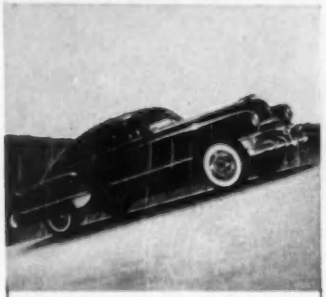
NEW BLUE SUNOCO...A TRIUMPH OF GASOLINE CHEMISTRY



New High ANTI-KNOCK POWER—NEW Blue Sunoco flattens steepest hills . . . makes miles seem shorter. Tell your customers how its NEW HIGH anti-knock power is like added horsepower under the hood.

New High ALL 'ROUND PERFORMANCE—Mile after powerful mile cars deliver top performance with NEW Blue Sunoco. Tell 'em to fill up with this revolutionary high-test gasoline today. They'll *feel* the difference.

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NEW BLUE SUNOCO

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TEST GASOLINE..AT REGULAR GAS PRICE

SUNOCO!

World's most Modern High-test Gasoline for the World's most Modern Engines!

MEMO TO:

Car Dealers

WHEN DEMONSTRATING your 1950 cars... fill them with New BLUE SUNOCO— the new high-test gasoline packed with NEW HIGH ANTI-KNOCK POWER!

Designed for the New High Compression Engines

NEW BLUE SUNOCO is packed with New Power for Every Car!

MAKE SURE

your customers keep on getting top performance from the cars you sell... recommend sensational New BLUE SUNOCO!

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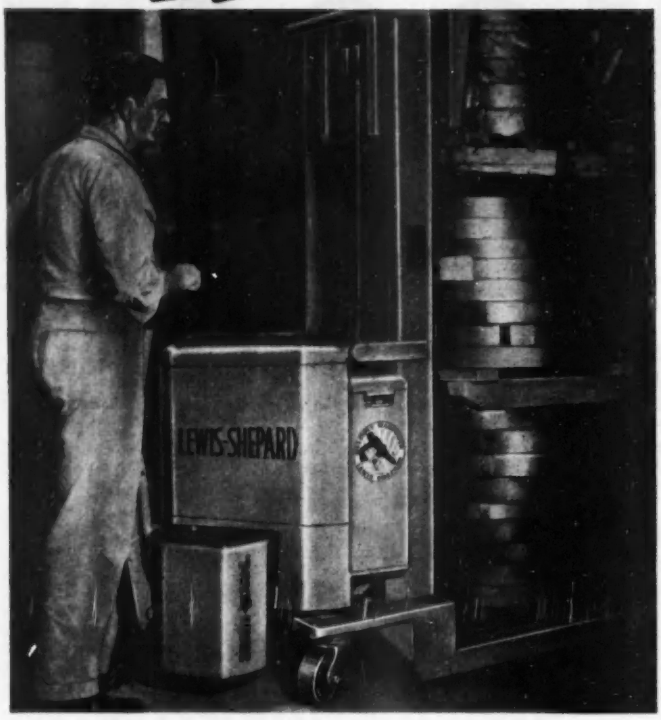


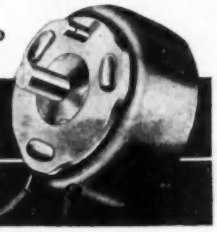
LEWIS-SHEPARD Chose LEDEX *ROTARY* SOLENOIDS *for* RUGGEDNESS!

Lifting, lowering, moving and stacking three and four thousand pound loads day in and day out requires rugged, heavy-duty equipment. Just as rugged are the two #7 Ledex *Rotary* Solenoids buried deep in the heart of the "JackStacker's" powerful hydraulic lifting mechanism. The flow of oil in the hydraulic lifting mechanism is controlled by these two heavy-duty Ledex *Rotary* Solenoids, submerged completely in hydraulic fluid.

The same ruggedness required for *this product* is available for *yours*. The five versatile sizes of Ledex *Rotary* Solenoids may be found in many production applications from airborne remote-controlled engine fire extinguishers to automatic lawn sprinkling systems.

We supply to quantity users and solicit the opportunity to be of assistance in engineering a Ledex *Rotary* Solenoid to meet the demands of your product.

Write today for LEDEX ROTARY SOLENOID BASIC ENGINEERING DATA



G. H. Leland INC.

160 WEBSTER STREET, DAYTON 2, OHIO

Proved Reserves of Oil and Gas

(*Continued from page* 45)

any desired rate, because the flow of oil through the pores of the oil-bearing rocks is definitely controlled by the physical factors of the reservoir. As a matter of fact, today's known oil can be recovered only over a period of many years and at gradually declining annual rates. This has been widely demontrated by past performance under all kinds of operating conditions. Therefore, only incorrect conclusions as to the life of these reserves can be obtained by dividing these reserves by the current rate of production.

Production of crude oil and natural gas liquids in 1949 was estimated at 2,017,347,000 barrels, a drop of 168 million barrels under 1948's record-breaking total of 2,186,197,000 barrels.

Production of natural gas was estimated at 6.2 trillion cu ft, an increase of 237 billion cu ft over the preceding year.

Nash Rambler

(*Continued from page* 45)

belt. In other respects the engine has features common to Nash practice—the sealed-in intake manifold, one-piece exhaust manifold combined with the exhaust pipe, Uniflo-Jet carburetor, U-Flex steel oil rings and sealed cooling system with pressure cap.

The muffler is flexibly supported at the rear end by a new type fabric loop.

Other mechanical features include: Self - centering, two - shoe hydraulic brake system; low pressure tires; hypoid rear axle with ratio of 3.777 to 1; worm-and-roller type steering gear.

Lou Moore's New Indianapolis Car

(*Continued from page* 36)

the spoke type.

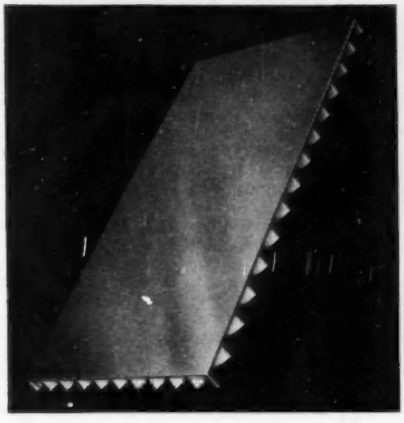
Front suspension is torsion bar type, with transverse springing in the rear. Moore feels the general construction of the suspension is improved. Lighter mounting brackets of 4130 steel save three or four lb on the front end. New shock absorber mountings are designed to allow quicker replacement, and the steering knuckles also are improved.

When asked why he built a rear drive car instead of another of his highly successful front drive cars, Moore referred to the cost factor—about $22,000 for a rear drive car against $32,000 for a front drive. Also, the front drive car can be raced only once a year, at Indianapolis, while rear drive cars can enter about twenty 100-mile AAA sanctioned dirt track races.

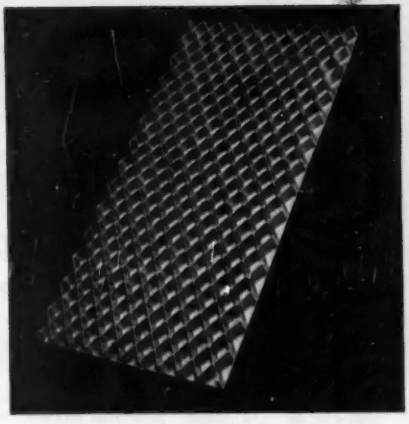
MAGNESIUM DIE CASTINGS

They're Economical!

You don't have to pay a premium to get the plus values offered by magnesium. *Dow magnesium die castings are priced competitively with those in other metals*, and in some cases they are cheaper. Long past the experimental stage, the value of magnesium die castings has been proved by a great number of applications in many different industries.



Hold Flatness to close Tolerances?



Dow can do it in Magnesium!

It was necessary to hold the flatness tolerance of this mounting base to 0.030" in 30 inches. Other requirements were maximum lightness, high rigidity, and low cost. Dow engineers met all these requirements in magnesium. Flatness was held within the desired limits and the strong, rigid 12" x 24" base weighed only 6.2 lb. The cost of the finished magnesium mounting base was competitive with high quality wood bases.

More and more die casting users are finding that magnesium has many advantages. Magnesium die castings have excellent dimensional stability and there is no tendency to solder to the die.

Small diameter cored holes can be cast to close tolerances, eliminating much machining. Any machining required can be done economically, for magnesium is the easiest of all metals to machine. And magnesium's unequalled lightness can add sales appeal to a wide variety of products.

If you have a die casting application, call the nearest Dow sales office or write direct. Find out how magnesium can improve your product. Use Dow's product facilities for high quality die castings at competitive prices.

Write to Dept. MG-9

Magnesium Division
THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN
New York • Boston • Philadelphia • Washington • Atlanta
Cleveland • Detroit • Chicago • St. Louis • Houston
San Francisco • Los Angeles • Seattle
Dow Chemical of Canada, Limited, Toronto, Canada

Fiat's 1400 Model

(*Continued from page* 40)

several years. Steering is by screw and nut, the feature being a shock-absorbing drop arm. This arm is in two pieces, joined by pins in rubber bushings, and is effective in preventing the transmission of road shocks and vibration to the steering wheel.

Brakes are hydraulic, with larger cylinders for the front than for the rear. Drum diameter is 9¾ in. A feature of the brakes is the use of scoops for directing air to the interior of the drums. This appears to be the first use of internally-cooled brakes on a stock car. While effective in lowering the temperature, it is claimed that water and dust are not admitted. The brakes are built under Fiat-Baldwin patents. Another change is the mounting of an external contracting hand brake on the rear axle pinion shaft.

Frame and body form a unit, composed mostly of square section tubes, to which the panels are attached, but the design makes possible the use of custom-built bodies. At the front the radiator, engine, clutch, transmission, and suspension are attached by eight bolts. At the rear eight more bolts secure the axle, suspension and wheels.

Heating and so-called air conditioning are standard. This equipment consists of an electric fan, surrounded by a radiator coil taking water from the thermostatically controlled water outlet pipes. A valve allows the water flow to be shut off when the fan is required for cooling only.

A single piece curved windshield is fitted. Width of front and rear seats is 51 in. All doors open forward. Wind tunnel tests show that at 73 mph the horsepower absorbed in overcoming resistance is only 23, compared with 29 for the Fiat four-passenger 1100 model.

The 1400 model is just going into production at the Mirafiori factory at Turin, now being completely modernized with American plant and production equipment under Marshall Aid. It is expected that the present six cyl model will be withdrawn and possibly, at a later date, the 1100 four cyl model, leaving only the new 1400 and the two-passenger 500 models. The 1400 is intended for world's markets and has been under test for more than three years. Demonstration models are just going out to dealers in all parts of the world.

Before the first showing of the new Fiat at Geneva, Italian body builders had taken over this job for custom-body treatment, a number of these being shown at Geneva. They are mostly two-door, two- to four-passenger sports cabriolets. Siata, of Turin, goes further than the others by chassis modifications also. In their Daina type the compression ratio is increased to 7.2 to one, two downdraft carburetors are used and output is increased to 65 hp at 5000 rpm. A five-speed transmission is used in place of the stock Fiat four-speed set, the fifth being an overdrive with a ratio of 0.88 to one. The final axle ratio remains at 9-40. The size of the gasoline tank is increased to 13 gal, wheelbase is 94 in., weight reduced to 2090 lb. and speed increased to 93 mph. The body is special, being a two-door, two-passenger cabriolet.

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DV THERMOSTATS

Fill All Thermal-Control Needs of the Modern Cooling System!

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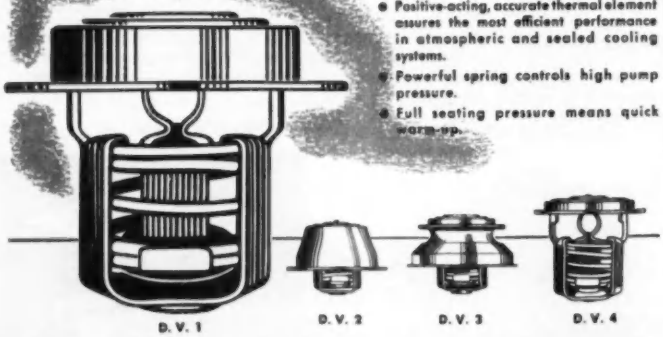
Accepted by leading car and truck manufacturers, new-type Dole DV Thermostats are a step ahead in employing entirely new basic principles. DV's are at last, a practical answer to the problems of higher pump pressure, high set pressure caps and resulting high pump efficiency. With Dole DV's, the designer now finds it possible to make the best use of smaller radiators and other advantages of modern engine design. Four basic types provide broad coverage of design needs.

- Positive-acting, accurate thermal element assures the most efficient performance in atmospheric and sealed cooling systems.
- Powerful spring controls high pump pressure.
- Full seating pressure means quick warm-up.



D. V. 1 D. V. 2 D. V. 3 D. V. 4

THE DOLE VALVE COMPANY CONTROL WITH DOLE

1901-1941 Carroll Avenue, Chicago 12, Illinois

Philadelphia • Detroit • Los Angeles

Sheet Aluminum Frame

(*Continued from page* 36)

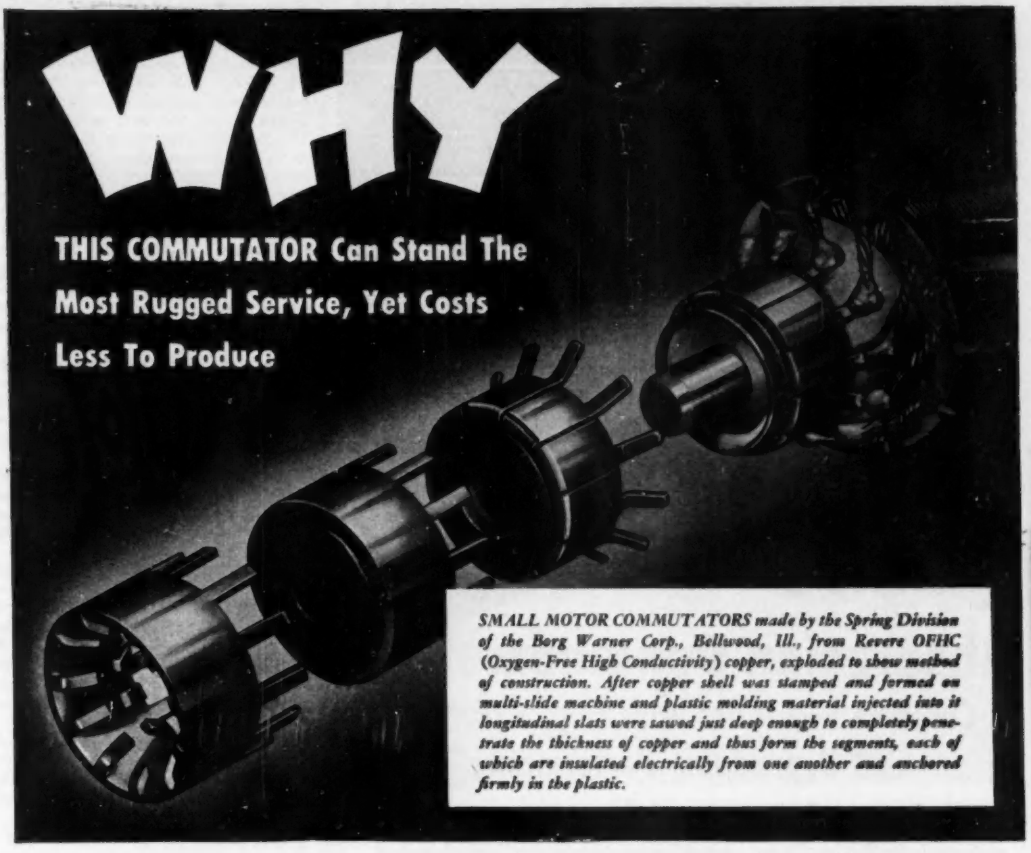
in. thick). These rails are formed and riveted together with make a frame member with a depth of five in. and a width of 1¾ in.

Because of the torsion bar suspension at both front and rear wheels, it has been possible to concentrate the points

(*Turn to page* 104, *please*)

WHY

THIS COMMUTATOR Can Stand The Most Rugged Service, Yet Costs Less To Produce



SMALL MOTOR COMMUTATORS made by the Spring Division of the Borg Warner Corp., Bellwood, Ill., from Revere OFHC (Oxygen-Free High Conductivity) copper, exploded to show method of construction. After copper shell was stamped and formed on multi-slide machine and plastic molding material injected into it longitudinal slots were sawed just deep enough to completely penetrate the thickness of copper and thus form the segments, each of which are insulated electrically from one another and anchored firmly in the plastic.

IT was quite a complex problem the Spring Division of Borg Warner Corp. dropped into the lap of Revere's Technical Advisory Service. They were getting set to manufacture commutators for small motors and they wanted to select the best material for the job.

Here were the specifications: The material had to be the hardest possible yet still able to take the extremely severe forming operation which was to be done in a multi-slide machine. High hardness was necessary in order to combine maximum wear resistance with the ability to withstand the extreme centrifugal force developed in small motors operating at high speeds. In addition, in the molding operation, which is done after the copper shells have been formed, it was necessary to hold the diameter of the shell to within .001" in order to prevent the plastic from flowing between the mold and the outer surfaces of the commutator. An equal tolerance was also imposed upon the height of the solid cylindrical portion for the same reason. Also of great importance was the need for the cylinder wall being almost absolutely flat.

Because of long experience with somewhat similar problems Revere recommended trial of OFHC (Oxygen-Free High Conductivity) copper, four numbers hard. This was tested along with several other metals. The OFHC alone was found to produce excellent parts, and with tolerances so close as to be almost unbelievable in this type of operation. All other types of copper failed at the very sharp bend where the anchoring lugs join the side of the shell.

An unusual feature of these commutators is the plastic material used in the core. Tough, and unusual in composition, it serves both as insulation and as a mechanical connection between commutator and shaft without use of a bushing and key.

To determine if these commutators could *really* take it, test motors in which they were used were speeded up to 35,000 rpm. Although the wiring in the rotors practically exploded at that speed, there were no failures in the commutators, Temperature tests up to 400° F. were also made. Here again there was no damage to the commutator, though the rotor wiring was badly damaged due to the combination of centrifugal force and decrease in wire strength. Once again the unusual combination of properties of Revere OFHC copper had played a part in helping another one of the country's leading manufacturers produce an outstanding product at less cost.

Perhaps this or some other Revere Metal can be of help in improving your product—cutting your production costs. Toward that end we suggest that you get in touch with your nearest Revere Sales Office.

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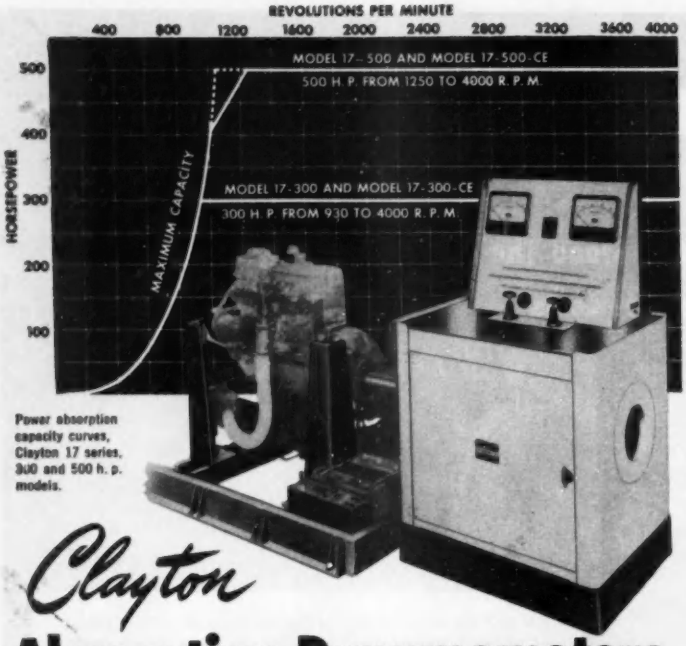
Sales Offices in Principal Cities, Distributors Everywhere.



Power absorption capacity curves, Clayton 17 series, 300 and 500 h. p. models.

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Absorption Dynamometers

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Absolute controllability . . . dependable accuracy . . . smoothness of operation . . . long life and physical compactness are all features offered exclusively by Clayton Turbo-closed System Absorption Dynamometers.

The high pumping characteristics of the power absorption unit are utilized to circulate the working fluid through a closed cooling system, in which is incorporated a heat exchanger to dissipate the heat generated by power absorption. This is accomplished without changing the quantity of water in the absorption unit. Optionally, air cooling is practical. With the Clayton Turbo-closed System Dynamometer, it is possible under many conditions to absorb 100 horsepower with less than one pint of water. Outstanding result of this exclusive Clayton development is the ability to maintain any torque load indefinitely.

Used by the U. S. Navy and U. S. Ordnance, Clayton Dynamometers provide the long life and trouble-free service demanded by the world's largest users of dynamometers. Equipped to receive the finest of laboratory instrumentation, they may also be adapted for various other types of instruments of less accuracies and lower cost. Standard equipment of Model 17-500-CE (illustrated above) includes direct reading electric speed and horsepower meters. Mail the coupon below for complete book describing the Clayton Turbo-closed System and illustrating its application.

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of greatest load at the cross members rather than along the frame channels. The front cross member, which supports the front suspension system, and all other frame supporting members are of cast magnesium and are machined to fit the box section frame. These frame supporting members are so designed that they fit completely around the box section, thus distributing the loading over a wide area rather than localizing it and overstressing the aluminum channel. They are fastened together by bolts both above and below the channel as well as by those passing through the box section itself. The inner and outer rails are separated by aluminum spacers at these points.

The cowl frame and all other body supporting members are made from 24 ST extrusions or formed aluminum rails. This entire structure is riveted together. The body is fastened to this framework by Dzus fasteners.

The radius rods are formed from 24 ST material, and the driving and brake torque are transmitted to the frame through an aircraft type spherical bearing.

The torsion bars, which are mounted parallel to the frame side members, are machined from 6150 steel forgings, and were designed and processed under the supervision of N. E. Hendrickson, U. S. Spring and Bumper Co., Los Angeles.

The rear axle is fitted with a magnesium center section which lowers the drive shaft 3½ in. below the axle center. This gives a lower seating position for the driver and provides a method of changing the gear ratio quickly without disturbing the ring gear and pinion.

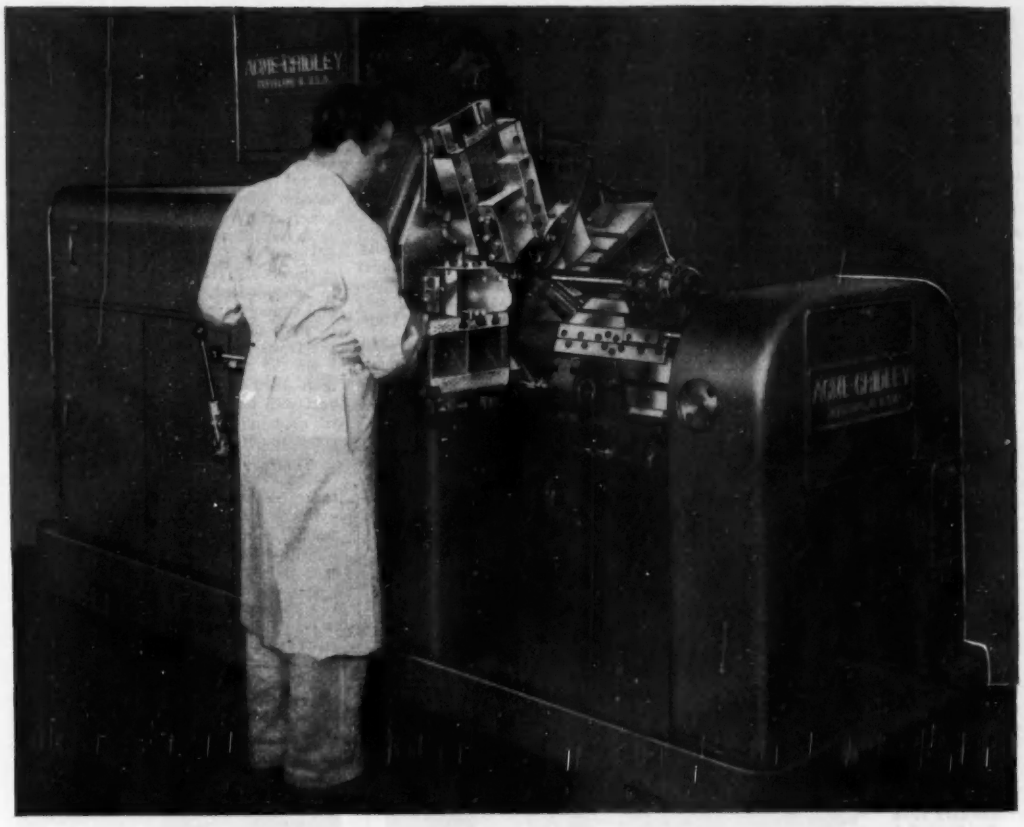
Both hydraulic and friction type shock absorbers are used on all four wheels. The brakes, specially constructed, are two leading shoe type, with 14-in. drums.

The independent front suspension is by "A" arms, with the torsion bar mounted on the top arm. The top arm is a steel casting and the lower arm is an aluminum alloy. The steering unit is the double drag link type.

Brady's car will be powered by a 6 cyl, 180 cu in. supercharged engine designed by Art Sparks. The engine has a bore of 3 3/16 in. and a 3¾ in. stroke. The centrifugal type supercharger is driven through a torsion bar which absorbs the shock from the gear drive mechanism. Sparks utilized the weight saving advantages of magnesium for the crankcase, gear tower, cam housings, and other castings where nonferrous metals could be used.

While light alloys are used more extensively in this design than in the past, the fuel tanks are made of steel to avoid the frequent fatigue failures experienced when aluminum tanks were tried.

Although this first chassis is being fitted with the 6 cyl Sparks engine, the Diedt-Schroeder design permits the installation of various types of power plants.



PRODUCTION: TEN TIMES FASTER!

Actual tests on customer jobs prove that the new Acme-Gridley Model M Single Spindle Bar Automatic turns out parts *up to ten times faster*. It's built for *production*—delivering sustained close tolerances and fine finish, at the fastest feeds and highest spindle speeds modern carbide tools can take.

Operation is completely automatic. The three cross slides and five end-turret slides are controlled independently through positive, simple camming. This provides opportunity for a wide range of time-saving combination cuts. The Model M is easy to tool, easy to operate—one man can handle several machines. Yet this same simplicity and versatility permit the economies of automatic operation on short-run jobs, as well.

For *"more good pieces in the pan at the end of the day"*, be sure to investigate the new Acme-Gridley Model M Single Spindle Automatic. May we show you production figures on your job?

The New Acme-Gridley Model M Single Spindle Bar Automatic, built in sizes 2⅝", 3½", 4¾" and 5½", is completely illustrated and described in this new Catalog M-50. Ask for your copy.

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300 Exhibitors at Swiss Show

(*Continued from page* 38)

previously uncovered in other European showings.

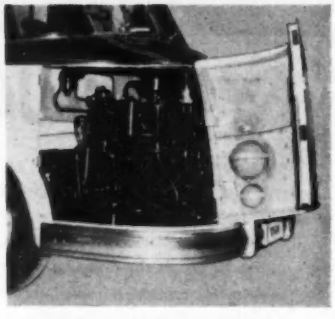
Fiat took advantage of the show to unveil the first completely new car produced in Italy since the end of the war. This new model, the 1400, is described and illustrated starting on page 39.

Mercedes led the German passenger car field with the Model 170S which although of prewar design, still has advanced European technique with tubular oval-section frame members, placed close together and having outriders for carrying the body, and its independent front suspension. Opel, controlled by General Motors, represented big German production with two models, the Olympia and the Capitain, with respectively four and six cylinder engines. Volkswagen, claiming to be the biggest single producer in Germany, has made no change in its passenger car models, but has added a nine passenger bus and an 1870 lb delivery truck (see Jan. 1 AUTOMOTIVE INDUSTRIES, page 19). These are now in production at the rate of eight per day, and employ the same rear engine as for the passenger car, with lower axle ratios.

In the one-ton truck line Tempo-Matador presented an air-cooled, front-wheel drive flat four with a centrifugal blower, the power plant being suspended to two cross members uniting the tubular side rails. These side rails are practically joined at the rear and receive a platform on which are pivoted the two half axles with coil spring suspension. The front suspension also is independent, by transverse spring and support arms, and the driver's seat is on a platform completely ahead of the front wheels.

On the Standard-Atlas, another German 1800 lb truck, the two-cylinder, vertical, two-stroke, aircooled engine is rear mounted, carried under the truck platform.

Henschel has secured maximum passenger-carrying space on a long-distance bus by mounting two Diesel six-cylinder engines in tandem across the frame, behind the radiator, completely ahead of the front wheels. Clutch and transmission are conventional, but the layout requires a very long three-section drive shaft to the worm-type rear axle. The radiator covers only the central portion, where the two engines are coupled. The front panels are hinged, and can be swung back, giving more complete access to the engines than with the average longitudinal engine mounting. The two engines, each of 190 hp, embody the Lanova head.



Two six-cyl 190-hp Diesel engines are mounted at the front of Henschel's bus in tandem as shown here. Hinged panels provide quick access to the power plants.

Apart from this cross mounting, the chassis follows more or less conventional lines.

French production revealed practically nothing that had not been seen at the Paris exhibition. Hotchkiss presented the final prototype of the Gregoire model with a light-alloy flat-four front mounted engine, independent suspension all round, front wheel drive, light-alloy chassis and six passenger body; three passengers being carried abreast on each seat. This car is expected to be in production by the end of the year.

(*Turn to page* 108, *please*)

A Small Valve for BIG JOBS

NOPAK 4-Way Model SL RING-TYPE Solenoid VALVE

NOPAK Model SL, 4-Way Ring-Type Solenoid Valve. Weight 5½ lbs., 5⅞" long, 3" wide, 5½" high. ½" pipe size only. Cylinder Ports may be reduced to ⅜" or ¼".

Does the work of bulkier, heavier and costlier solenoid valves of same capacity. Designed for air operation only, at pressures from 40 to 250 P.S.I. Functions effectively mounted in any position. Employs solenoid-actuated pilot rather than direct solenoid pull on sealing mechanism.

Has the Features you Want!

1. Light 3-piece valve body of drawn aluminum.
2. Chrome-plated Operating Shaft floats in Neoprene O-Rings — requires minimum lubrication.
3. Standard Solenoid Unit — easily replaced, readily available.
4. Current Economy — 0.96 amperes at 220 volts.
5. This valve gives you long-run, high speed operation . . . up to 500 cycles per minute . . . or continuous energization in one position.
6. Sub-Plate mounting furnished at extra cost, if desired.

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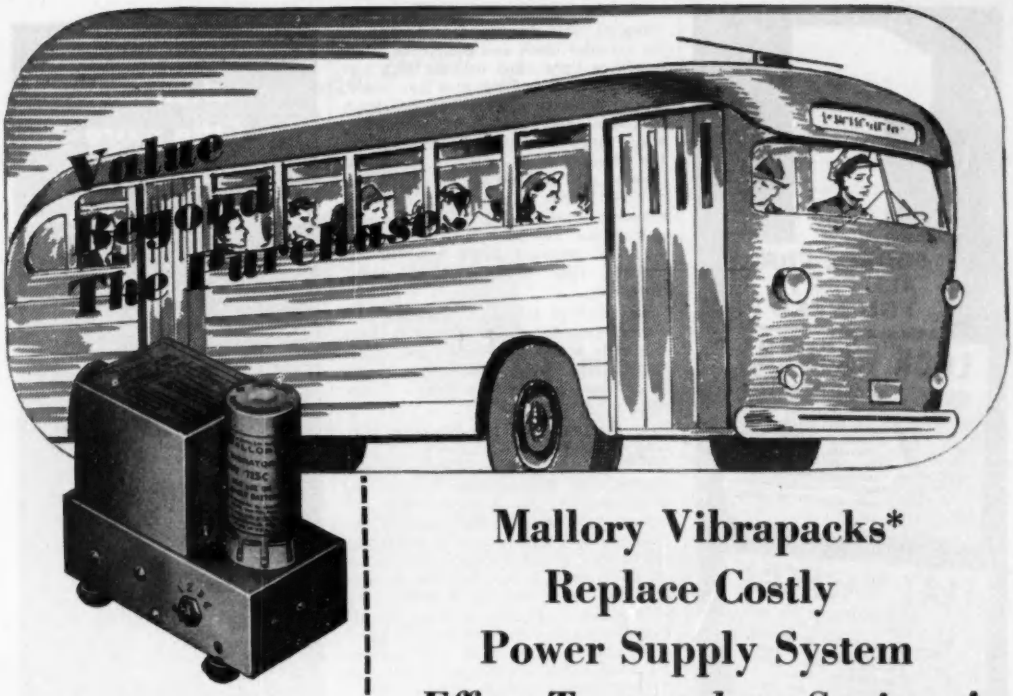

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Mallory Vibrapacks* Replace Costly Power Supply System *Effect Tremendous Savings!*

In one typical case, a simple and inexpensive circuit modification, developed by Mallory, made it possible for a manufacturer of mobile radio receivers to substitute Vibrapacks for a costly and less efficient power supply system. The conversion saved this Mallory customer $40,000 in the first year! In addition, thousands of dollars are being saved in maintenance costs. Servicing the old system required hours of labor . . . the new one requires only occasional replacement of the vibrator.

When you buy Mallory vibrator equipment you benefit by a winning combination of dependability, economical performance and creative engineering.

That's value beyond the purchase!

And whether your problem is electronic or metallurgical, what Mallory has done for others can be done for you!

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SOURCE FOR ALL PARTS YOU NEED

LOCK WASHERS
High carbon steel, bronze, aluminum, stainless steel, monel metal, spring lock washers . . . finished or plated with cadmium, nickel, brass or copper. Also Garrett's Aluminum Spring Lock Washer—light in weight with strength of steel.

FLAT WASHERS
Made to meet ASA and SAE specifications in regular steel spring steel, stainless steel, brass, bronze, monel metal, aluminum, Alclad and copper. Can be plated with zinc, cadmium, nickel, brass, chroma . . . or can be parkerized.

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From a small part for electronic instruments, automotive stampings and television chassis . . . Garrett can fabricate them better and cheaper than is possible in your own plant. Years of experience and modern high speed equipment assure speed deliveries . . . finished to your specifications.

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Flat and coiled springs to meet every requirement. Every Garrett spring has controlled tension built into it to assure satisfactory performance under all conditions. All types of flat springs . . . coil springs — compression, extension . . . made of round, square or rectangular wire.

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GEORGE K. GARRETT CO., INC.
PHILADELPHIA 34, PA.

GARRETT
MANUFACTURERS OF SMALL PARTS

Saurer displayed a V-eight Diesel, complete with five-speed transmission. Its cylinder block and crankcase are a one-piece light alloy casting with wet cylinder liners and two cast iron heads. The crankshaft is carried in five plain bearings, and the single camshaft, which provides pushrod operation for the valves, has six bearings. It has a bore of 4.33 in. and stroke of 5.51 in.

Alfa Romeo presented a new six cylinder Diesel of 4.72 by 5.51 in. bore and stroke, designed for rear mounting, and intended to be used in the coaches they build under Aerocar license.

In addition to the Crosmobile, the Swiss agent for this machine fitted an engine in a single-seater midget racer, the chassis of which was built up largely of Fiat parts, with a Lancia transmission.

In the boat section a small jet turbine giving a thrust of 370 lb and weighing 92 lb was shown by the Berger Co. It has three combustion chambers forming a ring, with the centrifugal blower in the center of the ring delivering air to the encircling chambers. From a single fuel pump on the lower portion of the central housing, fuel is led to each of the three combustion chambers. With an overall length of 40 in., this including the flame tube, and a diameter of 17.7 in., this jet is intended for use on boats and light planes.

Although automatic transmissions were well represented on American automobiles, European makers displayed only one, the German Kreis, marketed by the Italian S.I.B.A., of Milan. Entirely mechanical, the Kreis is claimed to be cheaper to manufacture than any hydraulic transmission and to be so compact that it can be applied to motorcycles. Two-wheelers equipped in this way were on exhibition. Of the spiral gear type, automatic changes are effected in the Kreis by a series of centrifugal and overrunning clutches. A lever under the steering wheel gives positions for normal running, reverse, and for locking the overrunning clutches in first and second of a three-speed transmission, to allow braking through the engine. It is claimed that the increased weight compared with a manually-shifted transmission is 10 to 15 per cent.

Oetiker exhibited an engine brake actuated by closing the exhaust pipe and simultaneously opening an air inlet placed between the carburetor and intake manifold. Used first for trucks, it is now applied to passenger cars. It is claimed that the type of valve now employed will not leak by reason of carbon deposits, and to reduce the physical effort necessary for operating the brake two valves of unequal size are used. For closing, a big-diameter valve shuts off the main flow of exhaust gas, complete obstruction being assured by a further movement closing the small valve. The opposite movement takes place when releasing the brake.

when just a little more— can be a whole lot less...

That "when" is when you're buying fasteners.

Here's why.

A good fastener costs very little more to buy than an ordinary one.

But a poor fastener can cost you more than you can afford in assembly time on your product.

Good fasteners can cost much less than their price!

Scovill Makes Good Fasteners.

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SCOVILL FASTENERS

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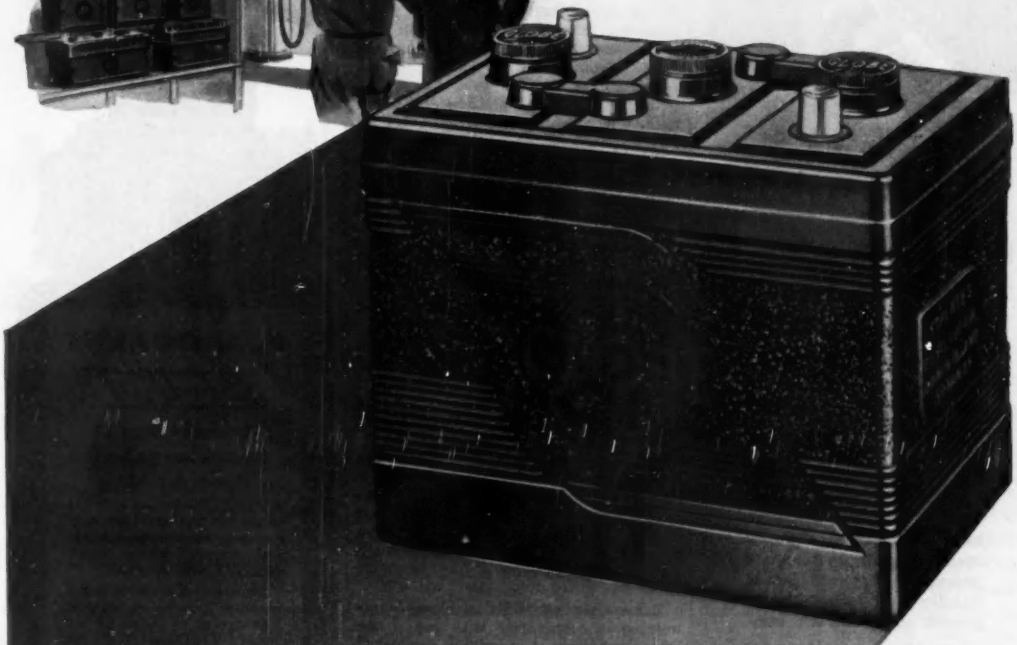
The dependably long life and split-second starting of Globe-Union batteries enlist the whole-hearted support of your dealers . . . help make satisfied customers for all your products.



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Custom-Built for Mass Distribution

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Our engineers too, are an important reason why you'll like Accurate Spring Service. They're old hands at springmaking . . . they've developed manufacturing systems and procedures that enable us to handle your jobs with the greatest speed and efficiency.

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Springs, Wire Forms, Stampings

Aluminum Foil

(*Continued from page* 41)

ods and materials used in the extensive parts depot.

In packaging as in other fields there is no cure-all or single answer for the gamut of problems. This is particularly true of a plant that handles sheet metal parts, body sections, curved one-piece bus windshields, engines and large running gear assemblies, as well as gaskets and expensive finely machined parts.

Out of the number of techniques employed here, there emerge two major methods, aluminum foil wrap and aluminum foil laminated heat-sealed bags, for packaging the variety of ferrous parts and gasket sets.

It is of interest that these two packaging methods have been approved by Army Ordnance for certain types of military parts shipments. GMC is therefore using these techniques not only for its own parts and service merchandising program but for military shipments as well.

According to the company the aluminum foil technique was conceived and used by the U. S. Army Medical Corps during the last war for shipment and protection of medical instruments. It has been demonstrated that aluminum foil, when used on ferrous parts, not only affords mechanical protection but is an effective corrosion preventive as well, through the mechanism of cathodic action. If there is any chemical attack on the package, it affects the aluminum, which becomes the anodic element, to the exclusion of the ferrous material. This protection is active indefinitely, although theoretically the aluminum foil needs must deteriorate and disintegrate after a long period of time.

Some time ago GMC package engineering in cooperation with one of the major suppliers of aluminum conducted tests to demonstrate protective qualities, application techniques, and the merchandising value of aluminum foil for wrapping finished ferrous metal replacement parts. This resulted in the adoption of certain gages of foil for different classes of parts together with annealing and embossing specifications.

As illustrated, aluminum foil for GMC is embossed with its characteristic design, including the phrase "Genuine Parts." This serves a number of valuable purposes. In the first place, it gives unique identification when on the shelf and is an aid in preventing substitutions. Also, aluminum foil has eye appeal and is pleasant and clean to the touch. Moreover, experience has demonstrated that the embossed areas serve in a practical way by holding protective coatings in place on the part wherever corrosion preventive oils are employed.

According to a statement by GMC, aluminum foil has demonstrated the

(*Turn to page* 112, *please*)

Cotton Picking

1950 STYLE

D. A. STUART'S

ThredKut

Reduces Cost of Machining Spindle Gears by 50%

ROTATING barbed spindles in the International Harvester cotton picker are the mechanical "fingers" which pluck cotton in modern fields.

In cutting SAE 8640 gears for these spindles on Gleason Revacycles, a dilution of Stuart's THREDKUT 99 reduced oil costs by 50%.

On the spindle broaching operation, done prior to barbing, this same Stuart product is performing with excellent results. The spindles are C1117 steel, hardness 83 on the Rockwell B scale.

On standard or special operations you will find that Stuart cutting fluids plus Stuart service are the combination that will reduce your costs. Ask for literature.

our 85th Anniversary Year!

D.A. Stuart Oil CO.

2733 S. Troy St., Chicago 23, Ill.

SERVICE TRUCKS WITH SALES APPEAL

BUILT FROM *Mayari R*

Morrison Steel Products, Inc., of Buffalo, builds "Carry-All" truck bodies that have several important features made possible by Mayari R low-alloy, high-tensile steel. Though designed for general-utility use, these versatile bodies meet the many special transportation requirements of plumbers, electricians, carpenters, roofers and other tradesmen.

Using bridge-type underbody construction with Mayari R, these bodies have greater than average strength . . . Mayari R has almost double the yield point of plain carbon steel.

Deadweight has been trimmed to the minimum . . . Mayari R permitted reduction in thickness of 1 or 2 gages in all sections.

Weather has little effect on the body sections . . . Mayari R has 5 to 6 times the atmospheric corrosion-resistance of carbon steel.

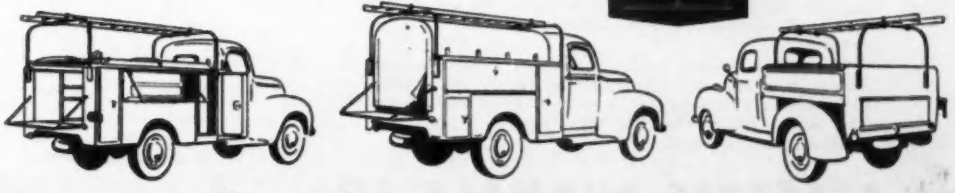
The finished bodies retain their clean appearance . . . because Mayari R has excellent resistance to denting and battering, and because paint lasts as much as 80 pct longer on Mayari R than on carbon steel.

Leading builders of trucks, trailers, buses, and many other types of vehicles are improving designs and increasing sales appeal through the use of this economical but superior grade of steel. For more information on Mayari R, its applications and properties, write for a copy of Catalog 259.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL



Mayari R *makes it lighter... stronger... longer lasting*

following practical advantages:

1—It provides a positive barrier to grease, and moisture or vapor transmission.

2—Major savings in packaging result from the moldability of the material. It is easy to apply and adheres closely to the part, thus saving considerable process time. Because of moldability about 50 per cent less foil is needed as compared with treated paper or cloth wraps.

3—The close adherence of foil with the parts provides a high degree of mechanical protection.

4—It is actually a low cost material, the cost of embossed foil being less than half the cost of Ordnance-approved CT-3 paper. And because of reduction in size of wraps, it has approximately the same cost as GMC treated paper.

5—Use of foil in some cases obviates the necessity for applying corrosion preventive oils.

Besides using aluminum foil as a wrap, GMC has adopted laminated kraft paper envelopes of various sizes, lined with aluminum, and heat-sealed for the packaging of gasket sets. This affords a moisture-vapor-proof container giving permanent protection.

Another form of packaging is a laminated tubular paper container, lined with foil, for engine valves, as illustrated. An interesting feature of this package is that it comes with a tubular closure made in several lengths so as to permit the packing of valves of different lengths in a standard container.

Rocker arm shafts coated with a light oil and wrapped in embossed foil are given perfect protection for at least three years of warehousing.

One example of the superiority of the new technique over other practices is found in the case of packaging high precision valves for military service as compared to current domestic specifications. Valves for the military are given a heavy coating of grease, which has to be removed before using, wrapped in waxed CT-3 paper and finally sealed with wax. Current domestic practice, however, is to wrap in foil after applying a light corrosion preventive, making parts ready for immediate use without resort to cleaning. In addition, the foil wrapper costs only about 5½ cents per sq yd, compared with about 12½ cents per sq yd for the waxed paper, plus a major saving in labor.

Perhaps one of the most troublesome problems incident to packaging motor vehicle parts is to provide a sure and lasting means of part number identification on large and irregular shaped parts such as tail pipes, accelerator rods, oil lines, axle shafts, etc. GMC has found the solution in the use of a laminated grease and moisture-proof tape with part numbers printed on by means of a GMC tape printer. The tape is applied on the part in one or more locations, depending upon the size of the part, affording easy and unfailing identification.

Ultramatic in Production

(*Continued from page* 49)

form so as to enter the band freely.

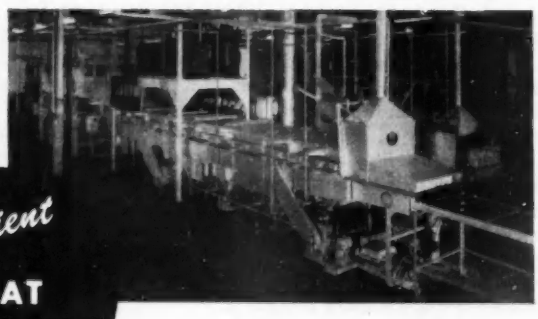
For assembly and curing of the cement, the band and lining are loaded on an expanding mandrel and mounted on a special electrically heated vulcanizing fixture. While held under mandrel pressure of at least 200 psi, the band is heated for six to seven minutes at a temperature sufficient to maintain the cement line at 375 to 400 F. As soon as this temperature gradient has been attained, mandrel pressure is relieved momentarily to permit gases to escape and is then re-applied for the rest of the curing period.

After curing and cooling, the band goes to a new New Britain No. 37 two-spindle precision boring machine for rough- and finish-boring of the friction face of the lining and grooving of the prepared surface. The next step is to saw through the center of the lug to part the band. This is done in a Kent-Owens horizontal mill, using a five-in. milling cutter, 0.375 in. wide.

The band assembly is then inspected all over for dimensional accuracy and proof tested, the joint at the lug being required to proof test at a 15,000 lb load.

Mention was made earlier of the die-quenching of the brake band after brazing. Gleason die quenching also is applied on two other parts of the transmission—the sun gear, and the reaction clutch housing.

The third article of this series describing manufacture and assembly of Packard's Ultramatic transmission will appear in an early issue of AUTOMOTIVE INDUSTRIES.



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HEAT TREATMENT

of metal powder products

● This combination gas-fired radiant tube and electrically heated continuous roller hearth furnace sinters molded metal powder products at 2050° F. It is 60 feet long and is equipped with an EF special atmosphere generator, dehy rator, and CO_2 removal unit.

Our wide experience, and complete line of production furnaces enables us to meet any requirement for ferrous and non-ferrous metal powder processing, fusing metal powders on strip and all other heating and heat treating operations.

More details on request.

THE ELECTRIC FURNACE CO.

GAS FIRED, OIL FIRED AND ELECTRIC FURNACES FOR ANY PROCESS, PRODUCT OR PRODUCTION

Salem - Ohio

Aircraft Products

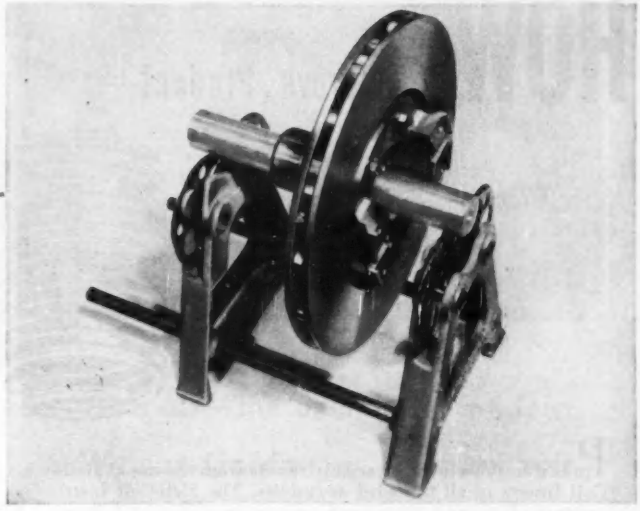
(*Continued from page* 94)

"flies" the fueling tube nozzle into the socket on the receiving airplane.

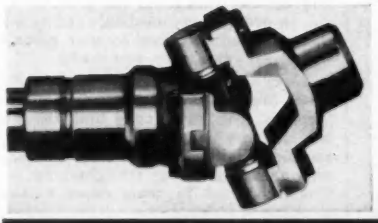
The "ruddevators" are equipped with the most unusual anti-icers ever built, it is announced. Developed and built by the B. F. Goodrich Co., the de-icers are made of rubber, in which heated wires are imbedded.

B-A-L-A-N-C-E-D

The Mechanics Universal Joint has a brake mounting that attaches the brake disc, or drum, to the transmission flange *—independent of the bolts that attach the joints to the flange.* This exclusive Mechanics feature makes it possible to balance the flange and drum—as a unit.



The accurate balance of the brake assembly is not disturbed, when installing the joint, because the bolts that attach the brake drum do not attach the universal joint to the flange—nor carry the universal joint torque. Thus the balance obtained on the balancing machine is maintained after installation of the joint in your product.



Let our engineers show you how this exclusive MECHANICS Roller Bearing UNIVERSAL JOINTS advantage will help improve the operation of your product.

MECHANICS UNIVERSAL JOINT DIVISION

Borg-Warner • 2024 Harrison Avenue, Rockford, Illinois

MECHANICS

Roller Bearing

UNIVERSAL JOINTS

For Cars • Trucks • Buses and Industrial Equipment

Mass Marquenching

(*Continued from page* 33)

C of 63 + with a carbon concentration of 0.88 per cent, and the 4820-H and 4815-H pins show a maximum Rockwell C of 61 + at a carbon concentration of 0.90 per cent. Due to this investigation, we are attempting to hold carbon concentration between 0.85 and 0.95 per cent.

After carburization, material is placed on a lowerator where it is submerged in a 1600 gal quench tank containing oil at 400 F. Both lowerator and quench tank are located next to the side discharge door of the furnace so that work is exposed to room temperature for only 20 sec. Parts are automatically time-quenched at the submerged work level where oil flow is greatest.

Oil bath temperature is held at 400 F + 2 F by six radiant tubes which may heat or cool is required. In order to obtain close control of oil bath temperature, a thermocouple was placed directly beneath the submerged work level.

When work returns from the oil, it is removed from the lowerator to a roller conveyor and transferred to mesh baskets. Work is held in the baskets until transformation is completed. This phase presents a problem since some parts require as much as five hr for completion of transformation before they can be washed and tempered. Therefore, there is a bank of material between the furnace and the washer. After sufficient time has elapsed for transformation, the baskets are placed on a power driven roller conveyor that passes through the wash and temper units. All Marquenched parts are tempered 1½ hr at 300 F. The conveyor is extended beyond the temper unit for 30 ft to allow the parts to cool and be inspected.

A fine tempered martensitic case structure is obtained by this process. Fig. 2 was taken from a tooth of a first speed countershaft gear made of 4820-H steel that was carburized at 1700 F, quenched in 400 F oil, cooled for four hr to room temperature, washed, and then tempered at 300 F for 1½ hr. Rockwell C hardness on the tooth's surface is 60.5 while the core at the pitch line, root line, and ⅛ in. below the root line is 43, 38, and 38 respectively. A conventionally quenched gear is shown in Fig. 3 for comparison of structure.

Since many parts were being Marquenched, a test program was established to determine distortion for each product. In setting up a checking procedure, parts were marked in the green and spotted throughout the production run in order to obtain data. Information gathered pertained to spur gears, helical cut gears, pins, and shafts.

Gears are taken from production every four hours and checked on gear speeders. We have found that distortion is very slight and well within specified limits. This is also true of pins and shafts, thus straightening is eliminated and in some cases finish grinding is reduced.

Transmission countershafts, for example, were originally quenched individually in tubes to reduce distortion and obtain uniform hardness. Now they are mass Marquenched; yet distortion on most shafts is within specified limits and hardness is greater than formerly obtained.

Summation of the data presented herewith shows that many variables such as: furnace temperature, carbon concentration, agitation of quenching medium, time cycle in cooling medium, and transformation period, govern Marquenching technique. Proper coordination of this combination produces a product that is superior in physical properties to an identical part that is conventionally heat treated.

HOW *your* **to Improve Product**

with the HELI-COIL INSERT

Product improvement invariably results from the use of Heli-Coil Inserts in all threaded assemblies. The Heli-Coil Insert protects all threads from wear, seizure, corrosion or failure.

Your customers, too, will praise Heli-Coil Inserts, because they eliminate down time, repairs, and complaints caused by failing threads or weak assemblies.

Heli-Coil Inserts . . . precision-formed coils of stainless steel or phosphor bronze wire . . . conform to S.A.E. standards, and are made in the full range of National Coarse and National Fine Thread Series; also in pipe thread and spark plug sizes. They are easy to install, economical, and permanently protect all threads.

Use them in original design or salvage . . . in all metals, plastics, wood . . . for a permanent trouble-free screw thread.

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Fully counterbalanced crankshaft—the ultimate in modern forging technique . . . Wyman-Gordon . . . crankshaft forging specialists since the introduction of the internal combustion engine . . . first to forge crankshafts with integrally forged counterweights . . . . . .

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Forgings of Aluminum, Magnesium, Steel

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STREAMLINE THE STEERING COLUMN, TOO— with

SSG COAXIAL TRANSMISSION CONTROL

Here is true functional styling. The unsightly rods and wires of the old-fashioned steering column disappear into a smart streamlined cylinder.

The trend to center dash instruments in front of the driver calls more attention than ever to the steering column. This handsome treatment gives your design the fine car look.

Look at the features you gain with the SSG Coaxial Transmission Control:

FUNCTIONAL STYLING—Cleans up the driving compartment. Conceals unsightly rods and wires.

"FEATHER-TOUCH" ACTION—Larger, sturdier bearings stay in alignment—give easy, quiet action.

POSITIVE ENGAGEMENT—Rugged construction assures positive shifting every time.

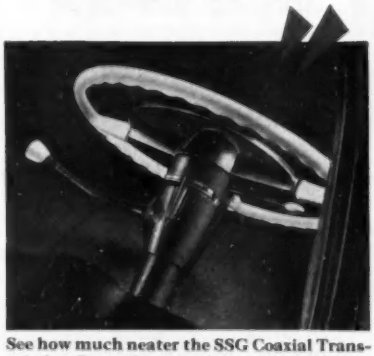
PROVEN DESIGN—Hundreds of thousands of these units in use prove acceptance of this idea.

AUTOMATIC OR MANUAL—Either type of transmission operates equally well with this control.

RATTLE RESISTANCE—Greater shaft and bearing diameters reduce rattles caused by whip and wear.

FOR FURTHER INFORMATION, WRITE OR PHONE—

Here is the last remnant of the "works" still exposed in modern car design. The rod and wires elsewhere are concealed by the dash panel, hood, trim, etc.



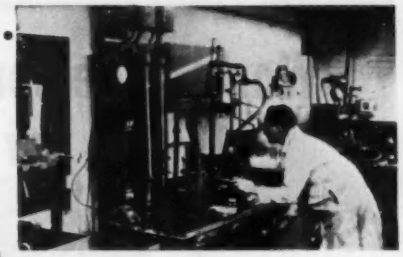
See how much neater the SSG Coaxial Transmission Control makes this steering column. Note also the SSG Turn Signal Switch faired into the wrapper.

Saginaw
STEERING GEAR DIVISION
Corporation, Saginaw, Michigan

SSG PRODUCTS

STEERING GEARS AND LINKAGES • PROPELLER SHAFTS • TRANSMISSION CONTROLS • TURN SIGNALS • DIESEL ENGINE PARTS • BALL BEARING SCREW AND NUT ASSEMBLIES • AUTOMOBILE JACKS

BECAUSE OF WHAT HAPPENS HERE...



Here's controlled filtration

...yours with the specially constructed accordion-type Purolator Micronic* Oil Filter

PERCENTAGES BY WHICH PUROLATOR MICRONIC ELEMENT EXCELLED COMPETITIVE TYPES

COMPETITOR	AVERAGE DIRT RETENTION PUROLATOR LED BY:
A	199%
B	220%
C	113%
D	547%
E	164%
F	619%
G	255%
H	339%
I	318%
J	193%
K	237%
AVERAGE PUROLATOR SUPERIORITY	290%

CHECK THIS PROOF THAT PUROLATOR FILTERS BEST!

PUROLATOR PRODUCTS INC.
Rahway, New Jersey
and Toronto, Ontario, Canada

Constant laboratory checks assure controlled porosity in the special plastic-impregnated cellulose from which Purolator Micronic* Oil Filters are engineered. This, in turn, assures *controlled, uniform filtration* . . .oil cannot form channels and turn metal-chewing abrasives loose in the engines you make.

More than that—this special basic material is impervious to water, gas and heat. Purolator Micronic cannot warp, distort or disintegrate. It thus assures more mileage per refill . . . with worthwhile savings on replacements.

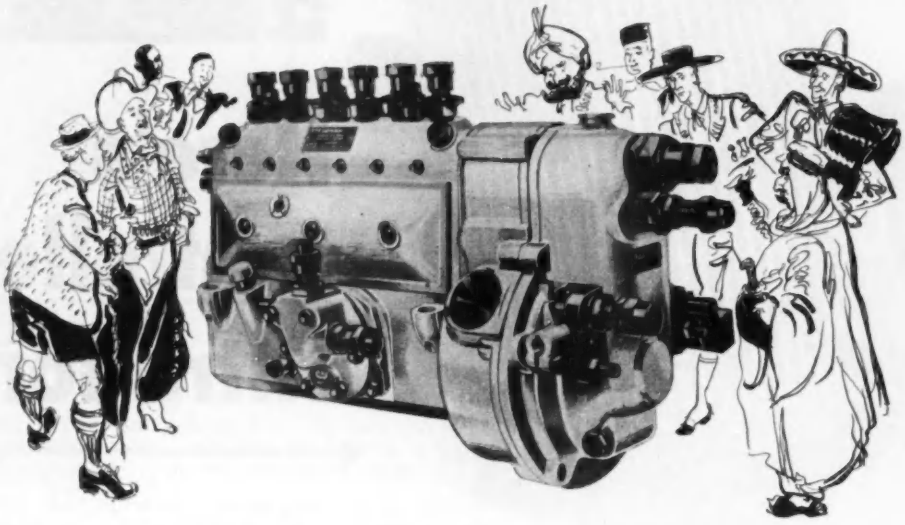
In addition, Purolator Micronic* traps abrasive particles as small as 39 millionths of an inch—offers the extra efficiency and longer life of a filtering area up to 10 times that of ordinary filters.

This story of Purolator's top performance is carried to your customers from coast to coast via The Saturday Evening Post, Life and other leading national magazines. Reason why you'll get better acceptance for engines and vehicles when you equip them with Purolator. If you have a special filtering problem, be sure to consult us now.

*Reg. U. S. Pat. Off.

PUROLATOR
MICRONIC OIL FILTER
"FIRST IN THE FIELD OF FILTERING"

World-wide service for Fuel Injection Equipment



See Precision Craftsmanship and New Research Methods at British Automobile Exhibition, New York

When diesel engines go abroad, service facilities are all important. The servicing of fuel injection equipment is a specialist's job—trained mechanics and special tool equipment are essential — there are C.A.V. Specialist Service Agents and Depots practically throughout the world. More are on the way.

See the typical examples of C.A.V. fuel injection equipment and electrical equipment for trucks and buses at the Show. A typical piece of research equipment specially developed in the C.A.V. laboratories is shown in the injection rate analyser. The rate at which fuel is injected into a diesel engine cylinder is of first importance in controlling efficiency and "diesel knock". The apparatus enables a direct visual analysis of injection rates to be made.

C.A.V. products shown include injection pumps, feed pumps, filters, governors, nozzles and nozzle holders; dynamos, starters, switchboards, electric door actuating mechanism, traffic indicators, etc.

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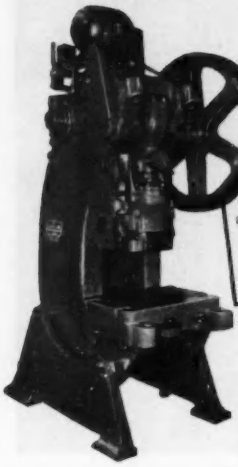
174/315

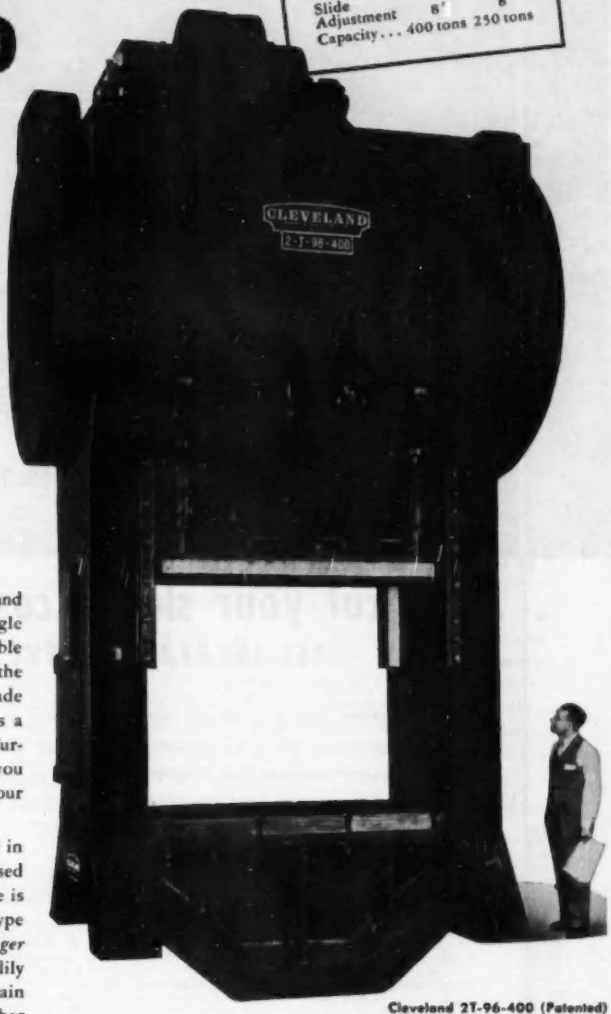
small or LARGE... make your next press a CLEVELAND



Bed Area F to B and R to L, 22"x32"
Standard Slide
Stroke, 3½"
Slide Adjustment, 3"
Capacity, 60 tons

Cleveland No. B-I Open Back Inclinable Press

	Inner Slide	Outer Slide
Bed Area (top)	60" x 96"	
Stroke	33"	22"
Slide Adjustment	8"	8"
Capacity	400 tons	250 tons



Cleveland 2T-96-400 (Patented) Double Crank, Double Action Toggle Press

You may not require a press as large as the Cleveland (patented) Double Crank, Double Action Toggle shown on the right, nor one as small as the Inclinable shown above, but you can be certain that out of the twelve standard types of Cleveland Presses made in a wide range of sizes and capacities there is a Cleveland that meets your exact requirements. Furthermore, our engineers will gladly work with you in designing any special Press required for your more unusual operations.

Many new design features have been included in the present model Clevelands that offer you increased production economies. Outstanding among these is the (patented) Cleveland air operated Drum Type Friction Clutch, which assures *closer control, longer die life* and *minimum rejects.* This Clutch can readily be installed on earlier Cleveland models to obtain greater efficiency and it is also adaptable to other makes of Presses.

A-1903

THE CLEVELAND PUNCH & SHEAR WORKS CO.
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PUNCHING TOOLS & DIES

FABRICATING TOOLS

OFFICES AT:
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Established 1880

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CLEVELAND 14, OHIO

Centrifugal found a way . . .

. . . to cut your sleeve costs

YET INCREASE SLEEVE LIFE AND PERFORMANCE!

Yes, at a **lower** cost, Centrifugal has found a way to give you longer wear, greater strength, higher heat resistance with greater tension and elasticity — qualities proved to bring oil economy, long engine life, higher compression and fewer repairs. It's due largely to Centrifugal's patented heat treatment process (partly shown above) and closely controlled composition.

In addition to low original cost, other savings result because the sleeves and piston rings you receive from Centrifugal are free from primary cementite or objectionable free ferrite. They are easily machined to steel-like finish that is free from hard spots and distortion. Scrap loss is held to a minimum — as low as 1.5%! No wonder more and more of the nation's leading engine builders are specifying Centralloy.

Centralloy

10 alloys to choose from — each designed to do a specific job better. Castings can be rough machined to your specifications. Write soon for brochure, "Revolutionary Results" and/or sample castings complete with specifications.

CENTRIFUGAL FOUNDRY COMPANY
MUSKEGON, MICHIGAN

Centrifugally cast electric alloys — heat-treated by exclusive patented process for Super Duty

Silastic* GASKETS AND SEALS SAVE TIME AND MONEY!

Photo courtesy United Air Lines

Photo courtesy Arrowhead Rubber Company

Silastic saves 93% of the flight delays caused by pushrod packing leakage.

Pushrod housing seals fabricated of Silastic by the Arrowhead Rubber Company of Downey, California, remain soft and pliable after 1100 engine hours in contact with hot oil at operating temperatures in the range of 450°F. That kind of performance has almost eliminated flight delays due to pushrod packing leakage.

Arrowhead's new rocker box cover gaskets of Silastic are easier to install and they have superior resistance to compression, hot oil and high operating temperatures. Use of these Silastic seals and gaskets cuts maintenance cost and minimizes the hazard of oil leakage.

No other rubber-like material can give comparable service in contact with hot oil at operating temperatures in the range of 350° to 500°F. In the automotive industry where production costs are a major consideration, Silastic oil seals are gaining general acceptance because they permit more simple design and reduce machining costs.

For more information on Silastic, call our nearest branch office or write for data sheet B-16.

Photo courtesy Saginaw Plant, Eaton Manufacturing Company

SILICONE INSULATION

SAVES PARTS PLANT $8,000 A YEAR ON 4 MOTORS

It takes less than 30 seconds to perform 5 operations on the hydraulic tappet lifters made in the Saginaw Plant of Eaton Manufacturing Company. About 105 times an hour, the 5 h.p., 3600 r.p.m. motors used to drive these machines are stopped by applying direct current to the windings. In this service, Class A insulated motors lasted from 2 days to 2 weeks. That amounts to something like 32 failures per year per motor.

Each failure cost at least 3 hours of down time plus $80.00 for rewinding with Class A materials. Rewound with Dow Corning Silicone (Class H) Insulation at a cost of about $150.00 each, these motors have a minimum life of 6 months. That's a net saving of more than $8,000 a year plus a good 400 man hours of labor and a bonus of some 40,000 parts that would have been lost because of down time.

For more information on Silicone Insulation call our nearest branch office or write for data sheet B-16-A.

Dow Corning Silicones Mean Business!

DOW CORNING CORPORATION, MIDLAND, MICHIGAN

ATLANTA • CHICAGO • CLEVELAND • DALLAS • LOS ANGELES • NEW YORK

IN CANADA: FIBERGLAS CANADA, LTD., TORONTO

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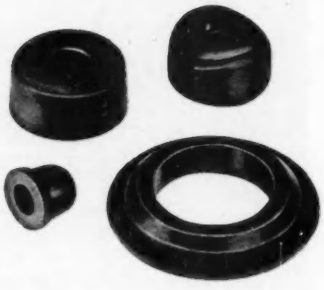
*T.M. Reg. U.S. Pat. Off.

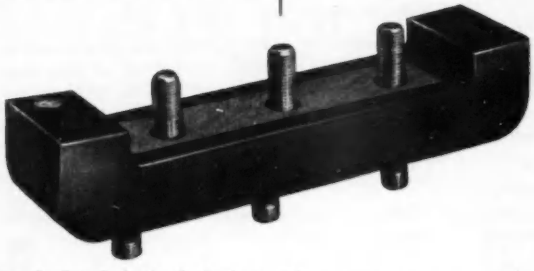
DOW CORNING

FIRST IN SILICONES

Design Problems get Industrial Solutions

with Inland's engineering collaboration





When asked to help in designing a piece or part . . . large or small, it doesn't matter . . . Inland draws on more than a quarter-century of engineering *and production* experience in working with metals, rubber, plastics and friction materials, for the automotive and other industries. And usually, too, these varied materials have been *combined* into an astonishing array of functional products, products which do definite jobs.

Inland's purpose, in every such collaboration, is to go far beyond a mere working solution of the problem . . . to evolve a design of the utmost simplicity . . . a design which permits easier, faster manufacture . . . a design which *slashes production costs!* But always this greater volume is combined with top quality. Inland's continuous and precise laboratory control of production assures exact duplication in all manufactured units.

There may be a piece, a part, a problem which is troubling you now. And there may be a solution, or a start toward a solution, in Inland's vast experience. Ask for Inland's collaboration . . . for an *industrial* solution of your *engineering* problem.

INLAND MANUFACTURING

INLAND MANUFACTURING DIVISION
General Motors Corporation • Dayton, Ohio

INLAND MANUFACTURING

WHERE PROBLEMS BECOME PRODUCTS
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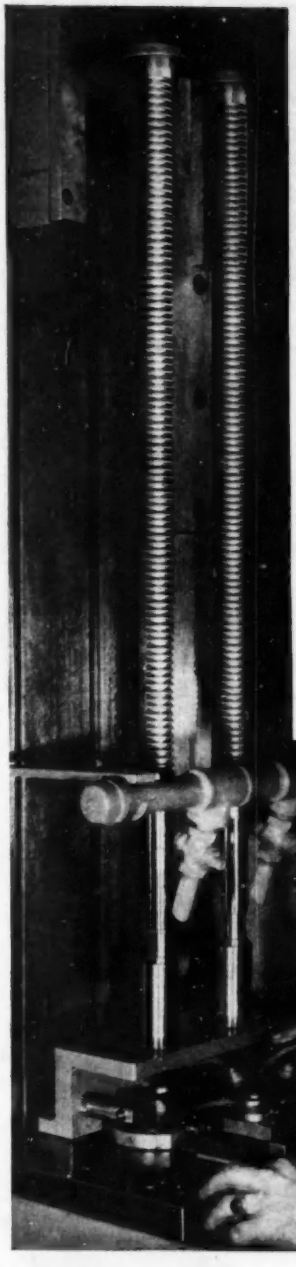

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Two station fixture on a standard American broaching machine enables this manufacturer to broach 10 serrations in a segment of the steering arm hole and finish broach the hole in one pass. Location of the 10 serrations is maintained by index flats on the broach shanks. An economical, high-production rate of over 250 per hour was attained on an American T-10-36 vertical hydraulic broaching machine, with hydraulically operated, manually controlled broach retriever . . . arranged for two station pull-down broaching. The fixture holds one part at each station completing two parts at each stroke of the ram. Two hand manual control assures absolute operator safety.

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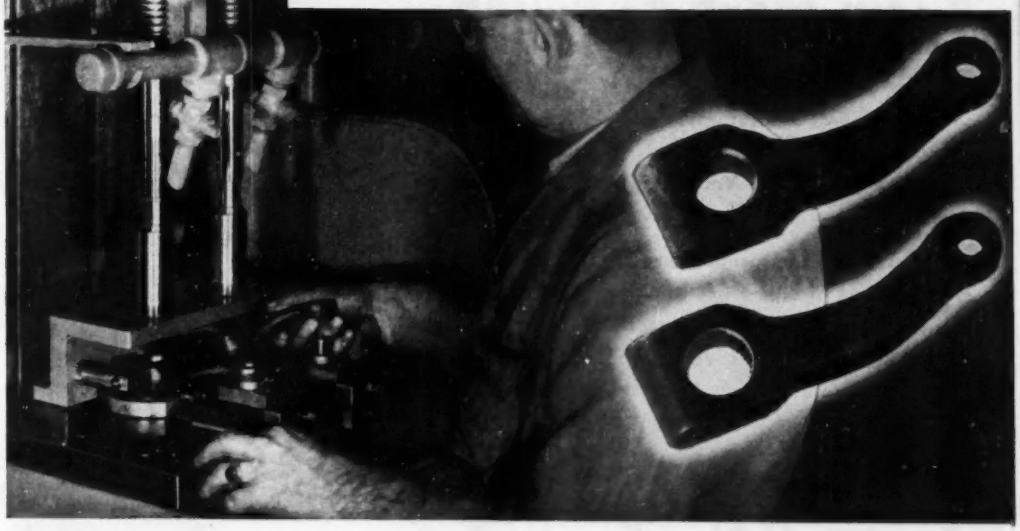

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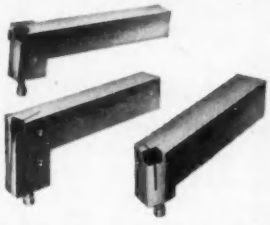

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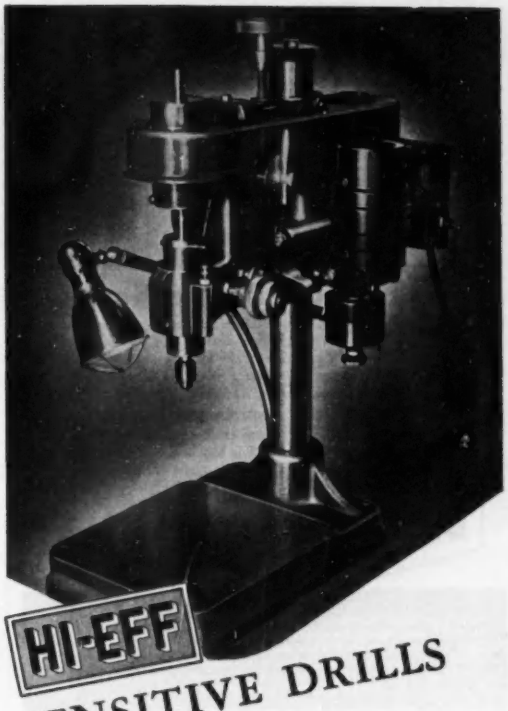

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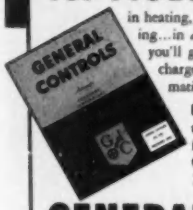

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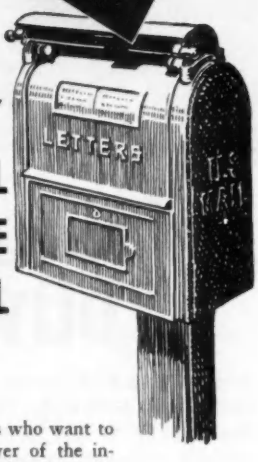

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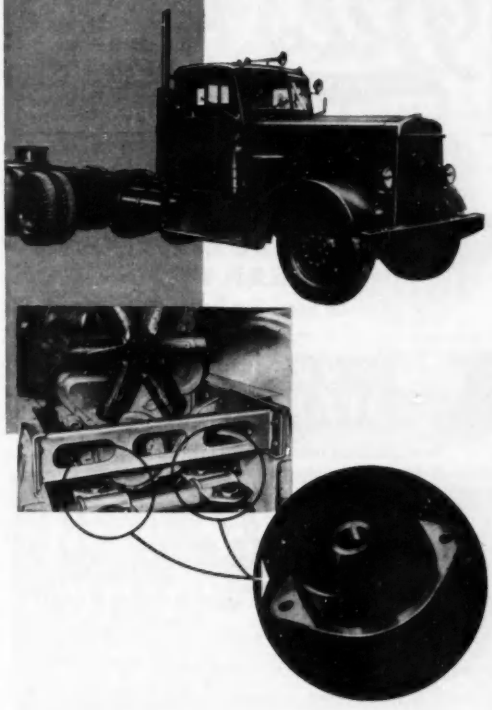
with a LORD vibration control system



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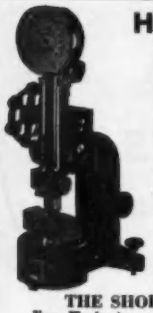

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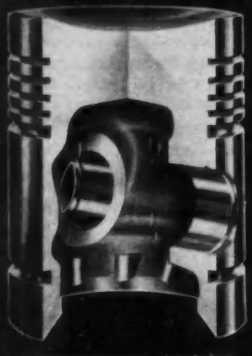

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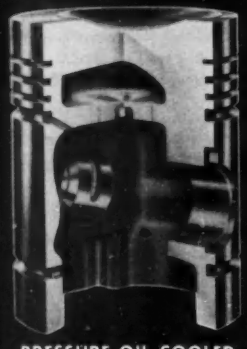

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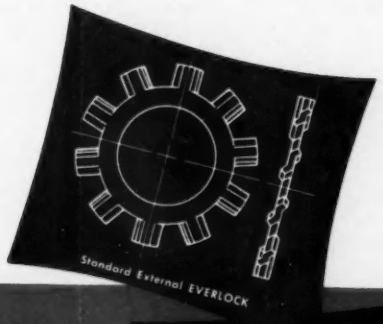

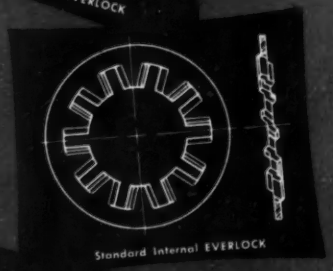

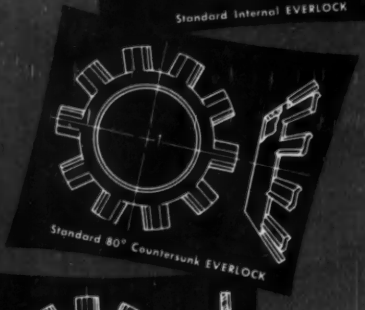

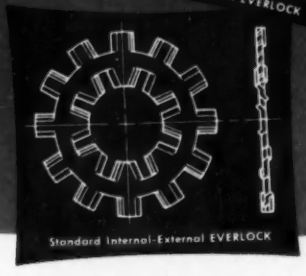

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